IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

INTELLECTUAL VENTURES I, LLC and INTELLECTUAL VENTURES II LLC,	)	
Plaintiffs,	)	
v.	)	Civ. No. 11-1025-SLR
NIKON CORPORATION, NIKON AMERICAS INC., and NIKON INC.,	)	
Defendants.	)	

MEMORANDUM ORDER

At Wilmington this 10th day of March, 2015, having heard argument on, and having reviewed the papers submitted in connection with, the parties' proposed claim construction;

IT IS ORDERED that the disputed claim language of U.S. Patent Nos. 6,121,960 ("the '960 patent"), 6,221,686 ("the '686 patent"), 6,979.587 ("the '587 patent"), 7,365,298 ("the '298 patent"), RE43,700 ("the '700 patent"), and 6,745,195 ("the '195 patent") shall be construed consistent with the tenets of claim construction set forth by the United States Court of Appeals for the Federal Circuit in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005), as follows:

1. **"[V]ariable-pixel control:"**[1] "Programming to determine and control which pixels of the screen will be used for displaying at least one key (or other input zone) and which pixels will be used for displaying the main image." This construction is

[1] Claim 19 of the '960 patent.

consistent with the specification, which states that "software-based variable-pixel controls are provided to determine and control which pixels of the touch screen will be used for displaying the keyboard representation and which pixels for displaying the main image." ('960 patent, col. 4:34-37) In stating that variable-pixel controls are provided "[i]n accordance with embodiments of the invention," the specification does not seek to alter the definition of variable-pixel controls among various embodiments, but rather clarifies that only certain embodiments use variable-pixel control. (*Id.* at col. 4:33) Because claim 19 discusses "using variable-pixel control to form a representation," the description of variable-pixel control from the specification informs the interpretation of claim 19. (*Id.* at col. 13:49-55) This construction is also consistent with the disclosure in the specification that variable-pixel controls are implemented by "programming schemes" to merge the main image and virtual keyboard (*Id.* at col. 4:43-46), and the disclosure that variable-pixel controls are implemented in hardware or software (*Id.* at cols. 5:50-55; 6:47-49). For example, plaintiffs' expert opined that BitBlt operations – described in the patent as one "highly efficient method" that may be used to "perform the merging of images" (*Id.* at col. 4:47-49) – may be implemented in either software or hardware "using programming instructions." (D.I. 158 at ¶ 5)

2. **"[P]ixels selected:"**[2] No construction is needed because claim 19 uses "selected" consistently with its ordinary meaning. Even though claim 19 recites a "computing device," nothing in the claims or specification require that the pixels be "read from memory." Plaintiffs' expert offered an alternative scenario in which pixels could be

[2] Claim 19 of the '960 patent.

provided directly from a direct digital signal without the use of memory. (D.I. 158 at ¶¶ 6-7)

3. **"[I]mage sensor:"**[3] "CMOS image sensor." Claim 14 of the '686 patent recites only the term "image sensor" (and not "CMOS"). ('686 patent, col. 6:17-20) In describing the scope of the invention, patentees again only use the term "image sensor."[4] The specification notes, however, that it "is related to an application entitled CMOS IMAGE SENSOR." (*Id.* at col. 1:9-10) Moreover, all of the examples provided in the specification are CMOS image sensors. (*E.g., id.* at cols. 1:19-21; 1:48-62; 2:25-28) Additionally, the specification explains some of the deficiencies in CMOS imaging technology, often resulting in image sensors with reduced sensitivity (*see id.* at cols. 1:19-21; 1:49-50) and discusses forming "CMOS devices" on substrate 11. (*Id.* at col. 2:25-28) More specifically, "[t]raditional CMOS image sensor implementations often form a silicide layer over the image sensing element thereby further reducing sensitivity," and "it is desirable to have an image sensor ... that does not use a silicide overlying the light sensing area thereby further increasing efficiency." (*Id.* at col. 1:48-57)

4. Plaintiffs' expert[5] opined that "[a]ll of the figures and examples in the '686 patent are CMOS image sensors." (D.I. 159 at ¶ 19) In response, defendants' expert

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[3] Claim 14 of the '686 patent.

[4] '686 patent, col. 1:16-18 ("[t]his invention relates, in general, to semiconductor devices, and more particularly to a semiconductor image sensor"); col. 4:62-63 ("[b]y now it should be appreciated that there has been provided a novel image sensor and method therefor.").

[5] For the sake of clarity and fairness to the parties, the court only considers testimony from experts representing the parties in the present litigation produced for the purposes of the instant dispute over the term "image sensor."

opined that a person of ordinary skill in the art would understand that claim 14 is not limited to a "CMOS" image sensor. (D.I. 146 at ¶¶ 17-20) However, defendants' expert was unable to provide any examples of disclosure of a non-CMOS image sensor in the '686 patent. (*Id.* at ¶¶ 13-20) The court's construction, therefore, is consistent with the specification, which discloses exclusively CMOS examples and focuses on improvements in CMOS technology.

5. **"[E]nhancement layer having a doping concentration that is less than the first doping concentration:"**[6] "A coating formed on the substrate having the same conductivity type as the substrate and having a doping concentration less than that of the substrate." This construction is consistent with the language of the claim, which requires that the enhancement layer have a doping concentration that is less than the first doping concentration attributed to the substrate. (*See* '686 patent, col. 6:21-26; *see also* col. 2:67-3:2 ("a heavily doped P-type substrate 11 having a lightly doped P-type enhancement layer 12 formed thereon"))

6. With respect to conductivity, the patent only contains two embodiments, both of which disclose an enhancement layer with the same conductivity type (p-type) as the substrate. (*Id.* at cols. 1:65-67, 2:1-10; 4:49-61; 2:67-3:2; figs. 1-8) During prosecution, the claims were allowed for the reason that "Applicant's enhancement layer [is] (1) of the same conductivity type as the substrate and (2) [has] a dopant concentration less than that of the substrate," whereas the prior art "teaches a substrate of the opposite conductivity type as Applicant's enhancement layer." (D.I. 133, ex. J13 at A-000338) Additionally, the inventors of the '686 patent admitted that, if the

[6] Claim 15 of the '686 patent.

enhancement layer were a different conductivity type than the substrate, the image sensor would not function as claimed. (D.I. 144, ex. N11 at 127:11-14; ex. N13 127:18-128:2) Given such strong intrinsic and extrinsic support, the fact that claim 15 does not specify that the substrate and the enhancement layer share "a first conductivity type" as in unrelated independent claims 1 and 19 does not compel a different construction.

7. **"[A] field area:"**[7] "A field oxide area." Claim 1 of the '587 patent recites "a field area for isolating electrically the active area," and the specification states that electrical isolation is achieved by forming a field oxide layer. ('587 patent, Abstract; cols. 5:34-35; 6:49-54; 6:63-67; 7:66-8:8) Regarding formation of the field oxide area, the specification explains that "the surface of the p-type epi layer 22 where the field stop layer 25 is formed is oxidated so to grow the field oxide layer 26 on the field stop layer 25." (*Id.* at 6:44-47) Adding the requirement that the field oxide area be "thick" lacks intrinsic support and introduces unnecessary ambiguity.

8. **"[A] field stop layer being formed beneath the field area and being wider than the field area in a direction towards the active area:"**[8] "A doped layer formed beneath the field area and being wider than the field area in a direction towards the active area." This construction is consistent with the specification, which indicates that, "[a] field stop layer 25 having a greater area than the field oxide layer 26 as being extended towards the active area with a first predetermined distance is formed beneath the field oxide layer 26." ('587 patent, col. 5:35-38) Additionally this construction is depicted in the figures of the patent. (*See, e.g., id.* at fig. 4E)

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[7] Claim 1 of the '587 patent.

[8] Claim 1 of the '587 patent.

9. The claim, however, is limited by the prosecution history. *See Phillips*, 415 F.3d at 1317 ("The purpose of consulting the prosecution history in construing a claim is to exclude any interpretation that was disclaimed during prosecution." (citation omitted)). During prosecution of the '587 patent, the Patent Office rejected claim 1 as unpatentable over admitted prior art in view of United States Patent No. 6,528,342 ("Miyagawa"). The rejection was premised on the examiner's finding that field stop layer of Miyagawa (in the '587 patent, area 25 in figure 4E) consisted of two areas: the P^+ layer 48 and the P^{++} layer 64. The patentee responded that the field stop layer only included the P^+ layer 48 because the P^{++} layer 64: (1) had a higher concentration of impurities than the P^+ layer 48; (2) was formed in the photodiode; and (3) was formed after the P^+ layer 48 as well as the locos region 50 (analogous to the field area 26 in the '587 patent) and the end-type layer region of the photodiode. (D.I. 133, ex. J14 at A-000469-70) The examiner then withdrew his objection, stating that "[s]pecifically, the Examiner agrees with Applicant's argument that the [P^{++}] region 64 of Miyagawa cannot correspond to a field stop layer, as the region 64 is formed after the field oxide region 50 [i.e., the "field area"]." (*Id.* at A-000447) Therefore, plaintiffs are precluded from arguing that the field stop layer may consist of more than one region, where the second region is formed after the first region.[9] *See Anderson Crop. V. Fiber Composites, LLC*, 474 F.3d 1361, 1373 (Fed. Cir. 2007) (finding that applicant "clearly disclaimed" a directly extruded composite where applicant argued that the prior art's composite is "[1] directly

[9] The court does not address in this claim construction whether "a single layer formed in two separate steps" is the same as two regions formed one after the other.

extruded and [2] kept hot during the entire operation," and [3] requires post extrusion milling).

10. **"[C]overing . . . a portion of the photodiode:"**[10] Not invalid under 35 U.S.C. § 112 ¶¶ 1 and/or 2 as lacking antecedent basis and/or lacking written description. The use of "the photodiode" in the final limitation of claim 1 of the '587 patent derives antecedent basis from "the photodiode area" mentioned earlier in claim 1 because the specification explains that "photodiode area" is used interchangeably with the abbreviation "PD" (i.e., "photodiode"). ('587 patent, col. 5:25-29) Defendants argue that the term is nonetheless indefinite due to perceived inconsistencies in the use of "PD" or "the photodiode area" throughout the patent. Due to significant confusion among the parties about the proper interpretation and labeling of the figures in the '587 patent, the court makes the following observations: Figure 4E, which illustrates a cross sectional view of the I-I' line drawn in figure 3, does not clearly demarcate the bounds of the area labeled "PD," instead drawing an arrow to the area generally above areas 31 and 29. Figure 5A, which illustrates a plane view similar to that used in figure 3, more clearly delineates the area labeled "PD," showing that it encompasses at least a portion of the field stop layer 25 (with the remainder of the field stop layer 25 presumably obscured by the field oxide layer 26).[11] Regarding the placement of the gate electrode 27, it is impossible to determine from figure 4E whether the gate electrode 27 "cover[s] . . . a portion of the photodiode" because PD is not clearly marked. Although the "PD"

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[10] Claim 1 of the '587 patent.

[11] Although the parties contest the accuracy of the drafting of the "FD" line in figure 3 with respect to the term "aligned," neither party alleges that a similar drafting error was made with respect to the "PD" line in figure 5.

label does not appear in figures 5B-5D, by reference to figure 5A, it appears that the gate electrode 27 covers at least portion of the PD (specifically, part of the field stop layer 25 not visible in the cross-sectional view in figure 4E due to the placement of the I-I' line). In addition, absent an indication that the patentee intended "superposed" to mean "non-overlapping," the court discerns no inconsistency in the description in the specification of "a gate electrode formed on the substrate by covering the channel area and having one side superposed with a second width on one entire side of the photodiode contacted to the channel area." (*Id.* at col. 4:2-6) Accordingly, the court finds that the term "covering . . . a portion of the photodiode" is not invalid under 35 U.S.C. § 112, ¶¶ 1 or 2. Although such an interpretation avoids a finding of invalidity, it precludes plaintiffs from taking the position that the photodiode does not include at least part of the field stop layer 25.

11. **"[A]ligned:"**[12] "Lined up without overlapping." The parties do not dispute that the "n^+ diffusion layer 32" in figure 4E represents the FD area, nor is there any dispute that figure 4E shows no overlap between the FD area and the gate electrode 27. Rather, the parties dispute whether the area marked as "FD" in figure 3 was drawn in error, as figure 3 appears to show the FD area overlapping in part with the gate electrode 27. Defendants argue that the FD line should have stopped at the leftmost boundary of the "n^+ diffusion layer 33" which, apart from the different number designation, appears to be the same "n^+ diffusion layer" marked as number 32 in figure 4E. To resolve the apparent inconsistency between figure 3 and figure 4e, the court looks to the specification. In describing figure 3, the specification states that "a gate electrode 27 having one side

[12] Claim 3 of the '587 patent.

superposed entirely on one side of the PD connected to the channel area ch with a second predetermined distance and the other side aligned to the FD is formed on the substrate 21." ('587 patent, col. 5:39-43) The specification further states that "an n+ diffusion layer 33 is formed **at the other side** of the gate electrode 27." (*Id.* at col. 5:51-52) (emphasis added) Throughout the rest of the specification, the patentee describes diffusion layers as "aligned to an edge" or "aligned with a predetermined distance from the edge" of the gate electrode, but does not describe or depict any overlap with the gate electrode. (*See, e.g.*, *id.* at cols. 2:25-29; 4:31-36; 4:43-59; 5:44-50; 7:63-64) Moreover, both parties cite The New Oxford American Dictionary, which defines "align" as "place or arrange (things) in a straight line" and "lie in a straight line." (D.I. 138, ex. 3) The bulk of the evidence supports the conclusion that the FD line in figure 3 was drawn in error and that "aligned" should be construed consistently with its use throughout the rest of the specification as "lined up without overlapping."

12. **"[M]ulti-layer interlayer insulating films ... stacked in at least two layers of oxide film having different density and the refractive index so that the density and the refractive index of the upper interlayer insulating film becomes lower than that of the lower interlayer insulating film as the multilayer interlayer insulating films proceed upward:"**[13] "Two or more oxide films sequentially stacked on a photodiode, with the uppermost layer having the lowest density and refractive index, and the lowest layer having the highest density and refractive index." This construction is consistent with the specification which explains that "multi-layer interlayer insulating films 104 and 108 insulating between layers of the top parts of the

[13] Claim 1 of the '298 patent.

field insulating films 100 and photodiode 102 and being stacked in at least two layers so that the density is lower in upper parts than lower parts." ('298 patent, col. 3:16-19; *see also* col. 4:23-26; 4:43-63)

13. This relationship exists for all layers consistent with the embodiment described in figure 3. For example, a third interlayer insulating film 214 is formed "having a lower density than the second interlayer insulating film 206." (*Id.* at col. 5:35-37) A fourth interlayer insulating film 220 is then formed "having a lower density than the third interlayer insulating film 214." (*Id.* at col. 5:44-46) This is followed by the formation of a fifth interlayer insulating film 226 having a lower density than the fourth interlayer insulating film 220. (*Id.* at col. 5:53-54) "[S]ince the density of the interlayer insulating film in the upper position becomes lower than that of the interlayer insulating film in the lower position as the multi-layer interlayer insulating films proceed upward, the refraction angle of the incident light becomes smaller and smaller." (*Id.* at col. 6:12-16) This is consistent with the object of the present invention - to improve the light-collection efficiency of the photodiode "by making the multi-layer interlayer insulating films have a lower density as they proceed upward to decrease the refraction angle of the incident light penetrated through the microlenses and color filters." (*Id.* at col. 6:26-29)

14. **"[A] light shield layer and an element protecting film sequentially stacked on the multi-layer interlayer insulating film:"**[14] "A light shield layer is stacked on a layer of the multi-layer interlayer insulating film and an element protecting film is stacked on a layer of the multi-layer interlayer insulating film." This construction

[14] Claim 1 of the '298 patent.

is consistent with the language of the claims and the specification, which explains that "the lower interlayer insulating film 104 on which the light shield layer 106 is formed." ('298 patent, col. 4:56-57) Additionally, the patent describes the "element-protecting film 120 [as] formed on the interlayer insulating film 108 . . . ." (*Id.* at col. 3:24-25; see also col. 4:64-67) By describing how the light shield layer and element-protecting film are to be stacked on the multi-layer interlayer insulating film, the specification adequately "informs, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014).

15. **"[I]n real time:"**[15] "As each image is acquired." Claim 1 describes "combining each successively acquired image of a field of a view with previously acquired images of fields of view, on an image by image basis in real time." ('700 patent, col. 10:17-20) During prosecution of the '700 patent, the patentee explained that a prior art reference "requires images . . . to be first captured before they are processed by a topology determination module . . . [The prior art] does not combine each successively acquired image in real time, as the claims recite." (D.I. 133, ex. J16 at A-001010) From this statement, both parties agree that the language "as each image is acquired" is appropriate. Defendants also seek to include the limitation "before a next image is received and digitized" from the following section of the specification describing a single embodiment of the invention: "It will be appreciated from the foregoing description of the present invention that the steps of receiving (141), digitizing (143), and combining (145) may be performed on an image by image basis so that each image

[15] Claim 1 of the '700 patent.

is received, digitized and combined with one or more previously digitized images **before a next image is received and digitized**." ('700 patent, col. 9:33-38) (emphasis added) During prosecution, the patentee referred to this embodiment as occurring "in real time on an image by image basis." (D.I. 133, ex. J13 at A-001568) However, such a statement falls short of demonstrating an intent to define "real time" and limit claim 1 to a single embodiment, especially where the specification describes the "present invention" as including the "foregoing description" of other embodiments. ('700 patent, col. 9:33-38)

16. **"[M]apping the images of fields of view onto regions of a cylindrical surface:"**[16] "Arranging images on a cylindrical surface by repositioning the pixels of acquired images relative to one another." This construction is consistent with the specification which explains that, "[b]ased on the spatial relationship between the discrete images 35, the images 35 are mapped onto respective regions of a smooth surface such as a sphere or cylinder." ('700 patent, col. 6:4-6) Additionally, "pixels in the discrete images 35 must be repositioned relative to one another in order to produce a two-dimensional pixel-map of the panoramic image 41." (*Id.* at col. 6:8-12) The specification also states that "stitching the discrete images 35 together to generate a panoramic image 41 **typically** involves mathematical transformation of pixels to produce a panoramic image 41 that **can** be rendered without distortion." (*Id.* at col. 6:17-21) (emphasis added) Therefore, although mathematical transformation may be required to render an image without distortion, such a transformation is optional. Contrary to plaintiffs' argument, the court finds nothing in the specification to support the

[16] Claim 1 of the '700 patent.

argument that less than all of the pixels of an image may be mapped onto the cylindrical surface. Rather, the optional blending of overlapping regions occurs after the "the images 35 are mapped onto respective regions of a smooth surface." (*Id.* at col. 6:4-7)

17. **"[I]mage[s] of field[s] of view:"**[17] "Image[s] of [an area] [areas] viewable through the camera lens." This construction is supported by the specification, which states: "The lens projects a focused image through the aperture and onto an image sensor in the IAU 17. The image sensor . . . develop[s] a digitized version of the image." ('700 patent, col. 3:12-15)

18. **"[C]hannel impulse response estimate obtainable from the first portion is reusable for acquisition of the second portion:"**[18] "Channel impulse response estimate that can be obtained from the first portion can be used for acquisition of the second portion." This construction most closely follows the claim language and is consistent with the plain meaning of "obtainable" as being "capable of being obtained." *See Innovention Toys, LLC v. MGA Entertainment, Inc.*, 637 F.3d 1314, 1317 (Fed. Cir. 2011) (affirming the construction of "the claim term 'movable' in light of the term's plain meaning as 'capable of movement'").

19. **"Kernel:"**[19] "Module." Plaintiffs' expert opined that a person having ordinary skill in the art would understand that "kernel" is akin to "module." (D.I. 136 at ¶¶ 49-50) The specification refers to the "OFDM Kernel" and "802.11b Preamble/HDR Kernel" depicted in figure 16 as "blocks," *i.e.* modules. ('195 patent, col. 9:45-47)

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[17] Claim 1 of the '700 patent.

[18] Claim 1 of the '195 patent.

[19] Claims 9, 11, 13 and 16 of the '195 patent.

20. The court has provided a construction in quotes for the claim limitations at issue. The parties are expected to present the claim construction to the jury consistently with any explanation or clarification herein provided by the court, even if such language is not included within the quotes.

United States District Judge