IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

Omni MedSci, Inc. *Plaintiff*, v. Apple Inc., *Defendant.*	Case No. 2:18-cv-00134-RWS

CLAIM CONSTRUCTION MEMORANDUM OPINION AND ORDER

Before the Court is the opening claim construction brief of Omni MedSci, Inc. ("Plaintiff") (Docket No. 85),[1] the response of Apple Inc. ("Defendant") (Docket No. 106), Plaintiff's reply (Docket No. 108), and Defendant's sur-reply (Docket No. 114). The Court held a hearing on the issue of claim construction on February 6, 2019. Having considered the arguments and evidence presented by the parties at the hearing and in their briefing, the Court issues this Order.

[1] Citations to the parties' filings are to the filing's number in the docket (ECF No.) and pin cites are to the page numbers assigned through ECF.

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I. BACKGROUND

Plaintiff alleges Defendant infringes three U.S. Patents: No. 9,651,533 (the "'533 Patent"), No. 9,757,040 (the "'040 Patent"), and No. 9,861,286 (the "'286 Patent") (collectively, the "Asserted Patents").[2] The Asserted Patents are related and each incorporates the disclosure of the others.

In general, the Asserted Patents and the '698 Patent are directed to using a light source to non-invasively determine characteristics of a material or substance, such as blood within biological tissue. For example, the '533 Patent discloses using spectroscopy to inspect a sample "by comparing different features, such as wavelength (or frequency), spatial location, transmission, absorption, reflectivity, scattering, fluorescence, refractive index, or opacity." '533 Patent 8:30–34. This may entail measuring various optical characteristics of the sample as a function of the wavelength[3] of the source light by varying the wavelength of the source light or by using a broadband source of light. *Id*. at 8:35–46.

Claim 5 of the '533 Patent is exemplary of a claimed system:

> **5**. A measurement system comprising:
> a light source comprising a plurality of semiconductor sources that are light emitting diodes, the light emitting diodes configured to generate an output optical beam with one or more optical wavelengths, wherein at least a portion of the one or more optical wavelengths is a near-infrared wavelength between 700 nanometers and 2500 nanometers,
> the light source configured to increase signal-to-noise ratio by increasing a light intensity from at least one of the plurality of semiconductor sources and by increasing a pulse rate of at least one of the plurality of semiconductor sources;

[2] Shortly before the Court issued the instant order, Plaintiff dismissed its claims for infringement of a fourth patent, U.S. Patent No. 9,885,698 (the "'698 Patent"). Though this patent is no longer in dispute, the parties heavily relied on the '698 Patent's disclosure in their arguments, and the '698 Patent's disclosure informed the Court's reasoning. Accordingly, citations to the '698 Patent's specification remain in this order.

[3] Wavelength and frequency are inverses, and as it concerns the relevant technology and the Asserted Patents, these terms are interchangeable. *See, e.g.*, '533 Patent 8:30–34 (describing a feature of transmitted light as "wavelength (or frequency)"). Accordingly, wavelength and frequency are used synonymously in this order.

> an apparatus comprising a plurality of lenses configured to receive a portion of the output optical beam and to deliver an analysis output beam to a sample
> a receiver configured to receive and process at least a portion of the analysis output beam reflected or transmitted from the sample and to generate an output signal, wherein the receiver is configured to be synchronized to the light source;
> a personal device comprising a wireless receiver, a wireless transmitter, a display, a microphone, a speaker, one or more buttons or knobs, a microprocessor and a touch screen, the personal device configured to receive and process at least a portion of the output signal, wherein the personal device is configured to store and display the processed output signal, and wherein at least a portion of the processed output signal is configured to be transmitted over a wireless transmission link; and
> a remote device configured to receive over the wireless transmission link an output status comprising the at least a portion of the processed output signal, to process the received output status to generate processed data and to store the processed data.

The Asserted Patents also disclose various techniques for improving the signal-to-noise ratio of the measurement. For example, the signal-to-noise ratio may be improved by increasing the intensity of the source light. *See, e.g.*, *id*. at 4:15–17 ("More light intensity can help to increase the signal levels, and, hence, the signal-to-noise ratio."). The source light may be pulsed, and the pulse rate may be increased to improve the signal-to-noise ratio. *See, e.g.*, *id.* at 5:11–15 ("The light source is configured to increase signal-to-noise ratio by increasing a light intensity from at least one of the plurality of semiconductor sources and by increasing a pulse rate of at least one of the plurality of semiconductor sources.").

The Asserted Patents also disclose modulating a characteristic of the source light to enhance the signal-to-noise ratio:

> For example, one way to improve the signal-to-noise ratio would be to use modulation and lock-in techniques. In one embodiment, the light source may be modulated, and then the detection system would be synchronized with the light source.

Id. at 16:58–62; '698 Patent 14:36–40. The '698 Patent discloses locking in on the pulse frequency of the light source to improve the signal-to-noise ratio. '698 Patent 21:51–55 ("Using a lock-in

type technique (e.g., detecting at the same frequency as the pulsed light source and also possibly phase locked to the same signal), the detection system may be able to reject background or spurious signals and increase the signal-to-noise ratio of the measurement.”).

II. LEGAL PRINCIPLES

A. Claim Construction

“It is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’ ” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To determine the meaning of the claims, courts start by considering the intrinsic evidence. *Id.* at 1313; *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed. Cir. 2004); *Bell Atl. Network Servs., Inc. v. Covad Commc’ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *Phillips*, 415 F.3d at 1314; *C.R. Bard, Inc.*, 388 F.3d at 861. The general rule—subject to certain specific exceptions discussed *infra*—is that each claim term is construed according to its ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the patent. *Phillips*, 415 F.3d at 1312–13; *Alloc, Inc. v. Int’l Trade Comm’n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003); *Azure Networks, LLC v. CSR PLC*, 771 F.3d 1336, 1347 (Fed. Cir. 2014) (“There is a heavy presumption that claim terms carry their accustomed meaning in the relevant community at the relevant time.”) (vacated on other grounds).

“The claim construction inquiry . . . begins and ends in all cases with the actual words of the claim.” *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1248 (Fed. Cir. 1998). “[I]n all aspects of claim construction, ‘the name of the game is the claim.’ ” *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1298 (Fed. Cir. 2014) (quoting *In re Hiniker Co.*, 150 F.3d 1362,

1369 (Fed. Cir. 1998)). First, a term's context in the asserted claim can be instructive. *Phillips*, 415 F.3d at 1314. Other asserted or unasserted claims can also aid in determining the claim's meaning, because claim terms are typically used consistently throughout the patent. *Id.* Differences among the claim terms can also assist in understanding a term's meaning. *Id.* For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id.* at 1314–15.

"[C]laims 'must be read in view of the specification, of which they are a part.' " *Id.* (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc)). "[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.' " *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). But, " '[a]lthough the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims.' " *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)); *see also Phillips*, 415 F.3d at 1323. "[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

The prosecution history is another tool to supply the proper context for claim construction because, like the specification, the prosecution history provides evidence of how the U.S. Patent and Trademark Office ("PTO") and the inventor understood the patent. *Phillips*, 415 F.3d at 1317.

However, "because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* at 1318; *see also Athletic Alternatives, Inc. v. Prince Mfg.*, 73 F.3d 1573, 1580 (Fed. Cir. 1996) (ambiguous prosecution history may be "unhelpful as an interpretive resource").

Although extrinsic evidence can also be useful, it is " 'less significant than the intrinsic record in determining the legally operative meaning of claim language.' " *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc.*, 388 F.3d at 862). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id.* at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert's conclusory, unsupported assertions as to a term's definition are not helpful to a court. *Id.* Extrinsic evidence is "less reliable than the patent and its prosecution history in determining how to read claim terms." *Id.* The Supreme Court has explained the role of extrinsic evidence in claim construction:

> In some cases, however, the district court will need to look beyond the patent's intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period. *See, e.g., Seymour v. Osborne*, 11 Wall. 516, 546 (1871) (a patent may be "so interspersed with technical terms and terms of art that the testimony of scientific witnesses is indispensable to a correct understanding of its meaning"). In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the "evidentiary underpinnings" of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal.

Teva Pharm. USA, Inc. v. Sandoz, Inc., 135 S. Ct. 831, 841 (2015).

B. Departing from the Ordinary Meaning of a Claim Term

There are "only two exceptions to [the] general rule" that claim terms are construed according to their plain and ordinary meaning: "1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of the claim term either in the specification or during prosecution."[4] *Golden Bridge Tech., Inc. v. Apple Inc.*, 758 F.3d 1362, 1365 (Fed. Cir. 2014) (quoting *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)); *see also GE Lighting Solutions, LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) ("[T]he specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal."). The standards for finding lexicography or disavowal are "exacting." *GE Lighting Solutions*, 750 F.3d at 1309.

To act as his own lexicographer, the patentee must "clearly set forth a definition of the disputed claim term," and "clearly express an intent to define the term." *Id.* (quoting *Thorner*, 669 F.3d at 1365); *see also Renishaw*, 158 F.3d at 1249. The patentee's lexicography must appear "with reasonable clarity, deliberateness, and precision." *Renishaw*, 158 F.3d at 1249.

To disavow or disclaim the full scope of a claim term, the patentee's statements in the specification or prosecution history must amount to a "clear and unmistakable" surrender. *Cordis Corp. v. Boston Sci. Corp.*, 561 F.3d 1319, 1329 (Fed. Cir. 2009); *see also Thorner*, 669 F.3d at 1366 ("The patentee may demonstrate intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope."). "Where an applicant's statements are amenable

[4] Some cases have characterized other principles of claim construction as "exceptions" to the general rule, such as the statutory requirement that a means-plus-function term is construed to cover the corresponding structure disclosed in the specification. *See, e.g.*, *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1367 (Fed. Cir. 2002).

to multiple reasonable interpretations, they cannot be deemed clear and unmistakable." *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1326 (Fed. Cir. 2013).

III. CONSTRUCTION OF DISPUTED TERMS

A. "beam"

Disputed Term[5]	Plaintiff's Proposed Construction	Defendant's Proposed Construction
"beam" • '533 Patent Claims 5, 13 • '040 Patent Claim 1 • '286 Patent Claim 1	photons or light transmitted to a particular location in space	photons or light transmitted to a particular location in space

<u>The Parties' Positions</u>

The parties and the Court agree that the term "beam" means "photons or light transmitted to a particular location in space" as defined in the Asserted Patents. *See* Docket No. 85 at 10; Docket No. 106 at 5; Docket No. 114 at 2. The dispute is whether this definition of a "beam" includes randomly directed light. *See* Docket No. 114 at 2.

Plaintiff argues that the term "beam" appears in the claims in the term "optical beam," and "optical beam" is defined in the Asserted Patents as equivalent to "optical light." Docket No. 85 at 10–11 (citing '533 Patent 9:28–38; '040 Patent 8:24–33; '286 Patent 10:14–23; '698 Patent 9:29–40). Thus, Plaintiff concludes that "beam" is used in the patents as "light." *Id.* at 11.

Defendant responds that an optical beam is light directed to a "particular" location, rather than to refer to scattered or undirected light. Docket No. 106 at 5 (citing '533 Patent 9:28–30; '040 Patent 8:24–26; '286 Patent 10:14–16; '698 Patent 9:29–31). Defendant argues that this is apparent from the descriptions of the embodiments, which distinguished light beams from

[5] For all term charts in this order, the claims in which the term is found are listed with the term but: (1) only the highest-level claim in each dependency chain is listed, and (2) only asserted claims identified in the parties' Joint Patent Rule 4-5(d) Claim Construction Chart (Docket No. 112) are listed.

undirected, scattered or stray light because the beam is directed to a location. *Id.* at 5–7 (citing ’533 Patent 5:15–18, 7:50–56, 10:12–16, 20:62–65; ’040 Patent Fig. 12C, 3:37–41, 4:6–10, 6:57–63, 15:45–47; ’286 Patent 4:6–11, 4:37–42, 5:3–7, 5:39–43, 8:47–53, 18:54–56; ’698 Patent 2:53–58, 3:20–25, 10:39–45, 20:35–38, 20:47–50, 24:12–14). Moreover, Defendant contends this use of “beam” comports with the ordinary meaning of the term, which equates “beams” with “rays” and “streams.” *Id.* at 8 (citing *Merriam-Webster’s Collegiate Dictionary* (11th ed., 2003), Docket No. 106-14 at 4 [hereinafter *Merriam-Webster’s*]; *The American Heritage Dictionary of the English Language* (5th ed., 2012), Docket No. 106-15 at 4 [hereinafter *American Heritage*]).

Plaintiff, in its reply, argues a “particular location” in space is the same as “a location” in space, and “particular” is unnecessary. Docket No. 108 at 2 (citing ’040 Patent 14:32–33, 14:46–47). Further, Plaintiff points out that the Asserted Patents describe an “incoherent beam,” meaning that scattered light delivered to a location is still a “beam,” and a “beam” is not necessarily a small point of light. Docket No. 108 at 3–4 (citing ’533 Patent Fig. 16A, 5:11–15).

Defendant filed a sur-reply to clarify that an “incoherent beam” is not the same as scattered light. *See* Docket No. 114 at 3. Rather, “scattered” light is light that is randomly diffused or dispersed and an “incoherent beam” is one in which the light is not all the same phase. *Id.* at 2–3 (citing ’040 Patent 20:45–50; *Merriam-Webster’s*, Docket No. 114-1 at 4; *Newton’s Telecom Dictionary* (26th ed. 2011), Docket No. 114-2 at 4–6 [hereinafter *Newton’s*]). Thus, according to Defendant, “beam” does not include scattered light. Docket No. 114 at 2–3.

Analysis

A “beam,” as the term is used in the Asserted Patents, is directed or aimed light. Each of the Asserted Patent provides the definition for “beam” that the parties propose:

> As used throughout this disclosure, the terms “optical light” and or “optical beam” and or “light beam” refer to ***photons or light transmitted to a particular location***

> ***in space***. The "optical light" and or "optical beam" and or "light beam" may be modulated or unmodulated, which also means that they may or may not contain information. In one embodiment, the "optical light" and or "optical beam" and or "light beam" may originate from a fiber, a fiber laser, a laser, a light emitting diode, a lamp, a pump laser, or a light source.

'533 Patent 9:28–37 (emphasis added). This definition plainly refers to a "beam" as directed or aimed light. The Court disagrees with Plaintiff that "particular location" here means the same as "location" to the extent that Plaintiff contends "location" means any indeterminate (random) point in space. Rather, a beam is directed at a particular location.

However, this does not mean that a "beam" necessarily has size or collimation constraints as Defendant argues. For example, the Asserted Patents describe various light sources that may be used to generate a beam, such a lamps, light-emitting diodes (LEDs), laser diodes (LDs), and super-continuum lasers (SC lasers). *See, e.g.*, '533 Patent 19:21–21:35. Some of these produce "beams that may be difficult to focus to a small area and may have difficulty propagating for long distances." *Id.* at 21:27–30. This suggests that a "beam" is not inherently focused or collimated. Further, the patents provide that the light source "***may*** . . . have one or more lenses on the output to collimate or focus the light." *Id.* at 20:25–26 (emphasis added). The optional inclusion of collimating or focusing hardware further suggests that a beam is not inherently focused or collimated.

The claims themselves suggest a "beam" may have spatial extents beyond a specific focus. In particular, the claims posit that, while a beam is directed at a particular location, the source need not be narrowly focused on the particular location. For example, Claim 5 of the '533 Patent includes "a plurality of lenses configured to receive ***a portion*** of the output optical beam and to deliver an analysis output beam to a sample." *Id.* at 29:56–58 (emphasis added).

Accordingly, the Court construes "beam" as "photons or light transmitted to a particular location in space."

B. "a plurality of lenses" and "one or more lenses"

Disputed Term	Plaintiff's Proposed Construction	Defendant's Proposed Construction
"a plurality of lenses" • '533 Patent Claims 5, 13	no construction necessary; plain and ordinary meaning	a plurality of transparent surfaces used to collimate (make parallel) or focus rays of light
"one or more lenses" • '040 Patent Claim 1 • '286 Patent Claim 16	no construction necessary; plain and ordinary meaning	one or more transparent surfaces used to collimate (make parallel) or focus rays of light

Because the parties' arguments and proposed constructions with respect to these terms are related, the Court addresses the terms together.

<u>The Parties' Positions</u>

Plaintiff contends that "lens," as used in the Asserted Patents and in the art, includes diverging and complex lenses as well as collimating and focusing lenses. Docket No. 85 at 12–15 (citing *American Heritage*, Docket No. 85-5 at 6–7; *Merriam-Webster's*, Docket No. 85-7 at 7; '533 Patent 7:16–24, 17:7–10, 20:12–26; '040 Patent Fig. 4, 6:20–28, 12:15–18, 14:61–15:8; '286 Patent Fig. 4, 7:60–8:1, 14:2–5, 18:3–17; '698 Patent 8:6–14, 23:23–42). Plaintiff further argues that the patents do not require that a lens is necessarily a transparent surface. *Id.* Moreover, Plaintiff asserts that Defendant's proposed construction improperly imports limitations from exemplary embodiments of lenses. *Id.*

Defendant responds that the "lenses" of the claims deliver a light beam to a particular location. Docket No. 106 at 9 (citing '533 Patent 29:56–58, 30:60–63; '040 Patent 24:22–24; '286 Patent 29:44–46; '698 Patent 31:38–40). Accordingly, defendant concludes that the lenses must collimate or focus the light, rather than disperse or diverge the beam. *Id.* Defendant notes that all exemplary beam-delivery lenses in the Asserted Patents collimate or focus the light. *Id.* (citing '533 Patent 18:47–49, 20:25–26; '040 Patent 12:8–10, 12:39–40, 13:7–9, 15:7–8; '286 Patent

13:62–64, 14:26–27, 14:61–63, 18:16–17; ’698 Patent 20:57–58, 21:22–24, 23:40–42). This serves a primary purpose of the claimed invention, namely, to increase the signal-to-noise ratio, by collecting and directing light to increase the intensity of light at a particular location. *Id.* at 9–10 (citing ’533 Patent 4:15–17; ’698 Patent 2:24–26). Defendant also contends that the extrinsic evidence confirms that a lens must collimate or focus rays. *Id.* at 11 (citing *Merriam-Webster’s*, Docket No. 106-7 at 4, 7). Finally, Defendant argues that a lens must be transparent else light could not pass through it, and thus, the lens could not focus, collimate, or even diverge light. *Id.* (citing *American Heritage*, Docket No. 106-5 at 6); *Merriam-Webster’s*, Docket No. 106-7 at 4, 7).

Plaintiff replies that the “lenses” of the claims should be broadly understood to include all types of lenses, including diverging lenses. Docket No. 108 at 2–4 (citing ’533 Patent Fig. 16A, 5:11–15; ’040 Patent 14:32–33, 14:46–47). Plaintiff notes that a lens may take light and focus it onto a smaller area, as Defendant suggests, but it may also take light and direct it onto a larger area. *Id.* According to Plaintiff nothing in the patents’ claims or descriptions limits the “lenses” term to the former. *Id.* Nor does the goal of increasing the signal-to-noise ratio require a focusing or collimating lens, as Defendant posits. *Id.* Rather, Plaintiff insists that the patents express various exemplary ways of increasing the signal-to-noise ratio, such as increasing the light intensity at the source, differencing signals, and increasing the pulse rate of the source, but none of these examples mention focusing the light to increase the signal-to-noise ratio. *Id.*

Analysis

There are two issues in dispute. First, whether the “lenses” of the claims are necessarily collimating or focusing lenses. They are not. Second, whether “lenses” are necessarily transparent. They are.

The "lenses" of the claims do not exclude diverging lenses. The Asserted Patents do not provide a definition for "lens." Instead, the term is used according to its ordinary meaning, which includes both converging and diverging lenses. *American Heritage*, Docket No. 85-5 at 6–7. While it may be that some or all the exemplary embodiments include focusing or collimating lenses, this is not sufficient to limit "lenses" to focusing or collimating lenses (and thereby exclude diverging lenses). *Phillips*, 415 F.3d at 1323 ("[W]e have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment."); *Thorner*, 669 F.3d at 1366 ("It is likewise not enough that the only embodiments, or all of the embodiments, contain a particular limitation. We do not read limitations from the specification into claims; we do not redefine words. Only the patentee can do that."); *SRI Int'l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc) ("The law does not require the impossible. Hence, it does not require that an applicant describe in his specification every conceivable and possible future embodiment of his invention.").

In its ordinary meaning, a lens is transparent. The extrinsic evidence of record establishes that a "lens," as customarily used, is transparent, and there is no suggestion that "lens" is used in the patents to denote something that is not transparent. *American Heritage*, Docket No. 85-5 at 6–7; *Merriam-Webster's*, Docket No. 85-7 at 7. Indeed, the evidence suggests that a lens transmits light in a certain way for its purpose. *See, e.g.*, *American Heritage*, Docket No. 85-5 at 6–7 (the lens is a "means by which light rays are refracted so that they converge or diverge to form an image"); '533 Patent 17:41–43 ("a camera lens 1656 may be used to image the wavelengths onto a detector or camera 1657"). Therefore, a lens cannot be opaque, it must transmit enough light to serve the purpose of the lens—to refract light.

Accordingly, the Court rejects Defendant's proposal as improperly limiting and Plaintiff's argument as improperly expansive, and determines that "lenses" has its plain and ordinary meaning without the need for further construction.

C. "modulating at least one of the LEDs" and "modulating of at least one of the LEDs"

Disputed Term	Plaintiff's Proposed Construction	Defendant's Proposed Construction
"modulating at least one of the LEDs" • '040 Patent Claim 1 • '286 Patent Claim 16	pulsing the light, or varying the frequency of the light, produced by at least one of the LEDs	varying the frequency of the light produced by at least one of the LEDs
"modulating of at least one of the LEDs" • '286 Patent Claim 19		

Because the parties' arguments and proposed constructions with respect to these terms are related, the Court addresses the terms together.

<u>The Parties' Positions</u>

Plaintiff argues that "modulating," with respect to the light from the LEDs used in the Asserted Patents, includes pulsing the light. Docket No. 85 at 15. Plaintiff points out that the claims recite that the modulated light has an "initial intensity," which indicates that the intensity may be modulated, i.e., pulsed. *Id.* at 16. Moreover, Plaintiff notes that the patents include descriptions of pulsing the intensity of the light. *Id.* (citing '040 Patent 14:48–51, 21:10–13; '286 Patent 17:57–60, 24:20–22; '698 Patent 14:44–47, 23:10–13). Finally, Plaintiff explains that "modulating" in the art includes modulating the amplitude or width of a pulse. *Id.* at 16–18 (citing *Microsoft Computer Dictionary* (4th ed. 1999), Docket No. 85-6 at 4 [hereinafter *Microsoft 1999*]; *Merriam-Webster's*, Docket No. 85-7 at 8, 10; *Microsoft Press Computer Dictionary* (3d ed., 1997), Docket No. 85-8 at 4–6 [hereinafter *Microsoft 1997*]; *American Heritage Science Dictionary* (2011),

Docket No. 85-9 at 2;[6] *Newton's*, Docket No. 85-10 at 6). Thus, Plaintiff contends that Defendant's proposed construction improperly limits "modulation" to modulating the frequency. *Id.* at 18.

Defendant responds that "modulating" light, as used in the '698 Patent, does not include pulsing light. Docket No. 106 at 12. Defendant contends that references in the patent to "continuous wave" and "pulsed" modes of LED operation and variance of light intensity do not denote forms of modulation. *Id.* at 12–13 (citing '533 Patent 16:66–17:3; '040 Patent 21:11–15; '286 Patent 24:21–25; '698 Patent 14:45–49). Rather, these are characteristics distinct from modulation. *Id.* (citing '533 Patent 19:63–20:11; '040 Patent 14:45–60; '286 Patent 17:54–18:2; '698 Patent 23:7–22.). Finally, Defendant argues that modulated light is distinguished from unmodulated light, both in the patent and the art, because modulating comprises varying a characteristic of the light to encode information. *Id.* at 13–15 (citing '040 Patent 3:46–52, 21:10–13; '286 Patent 5:12–18, 24:20–23; '698 Patent 2:60–66, 14:44–47; *Microsoft 1997*, Docket No. 106-8 at 5; *IEEE 100: The Authoritative Dictionary of IEEE Standards Terms* (7th ed. 2000), Docket No. 106-11 at 4; *Microsoft 1999*, Docket No. 106-6 at 4; *Merriam-Webster's*, Docket No. 106-7 at 8; *Newton's*, Docket No. 106-10 at 6).

Plaintiff replies that the term "modulating" broadly includes pulse and frequency modulation, and nothing in the patents' claims or descriptions limits "modulating" to frequency modulation. Docket No. 108 at 4–6. Rather, Plaintiff urges that modulating the intensity of the light is expressly contemplated in the claims and in the descriptions. *Id.* In particular, Plaintiff points out that the claims refer to an "initial light intensity" in the context of "modulating" and the description sets

[6] Available at https://www.dictionary.com/browse/modulate.

forth that LED modulation may be facilitated by pulsed mode of operation. *Id.* (citing ’286 Patent 24:21–26).

Analysis

The primary dispute is whether “modulating” in the claims is necessarily limited to “varying the frequency.” It is not.

As applied to the instant technology, the term “modulate” has a broad customary meaning. One dictionary defines “modulate” as “to vary the amplitude, frequency, or phase of (a carrier wave or a light wave) for the transmission of information.” *Merriam-Webster’s*, Docket No. 85-7 at 8. Another dictionary defines “modulate” as “[t]o change some aspect of a signal intentionally, usually for the purpose of transmitting information.” *Microsoft 1997*, Docket No. 85-8 at 4.

The Asserted Patents provide that modulation may be used to improve the signal-to-noise ratio of the measurement. *See, e.g.*, ’698 Patent 14:39–44 (“In one embodiment, the light source may be modulated, and then the detection system would be synchronized with the light source. In a particular embodiment, the techniques from lock-in detection may be used, where narrow band filtering around the modulation frequency may be used to reject noise outside the modulation frequency.”). In this application, modulation includes information in the light source that can be used to reject noise, and specifically, modulation injects information about the source of the light. This comports with the customary meaning of the term and with the patents’ statement that “[t]he ‘optical light’ and or ‘optical beam’ and or ‘light beam’ may be modulated or unmodulated, which also means that they may or may not contain information.” *Id*. at 8:27–29.

While it is clear that the patents contemplate adding information to the light source, they are silent as to what characteristic of the light is “modulated” to add this information.

Nothing in the patents or the extrinsic evidence supports Defendant's proposal to exclude pulsing a light from the scope of modulating a light. Pulsing a light inherently involves varying a characteristic of the light, including amplitude. Thus, under the customary meaning of "modulating," pulsing may add information by turning the light on and off, presumably in some predetermined pattern or sequence.

The patents' disclosure of a "change detection scheme" does not take pulsing outside the scope of modulating. The patents provide the change detection scheme as an alternate embodiment which may be modulated:

> In an alternate embodiment, change detection schemes may be used, where the detection system captures the signal with the light source on and with the light source off. Again, for this system the light source may be modulated. Then, the signal with and without the light source is differenced.

'698 Patent 14:44–47. Rather than distinguishing pulsing from modulating, this disclosure suggests that simply turning the light source on and then off is not modulating because it is not injecting information into the signal. Elsewhere, the Asserted Patents explain that pulsing provides information in the light beam that can be used to improve the signal-to-noise ratio. *See, e.g.*, *id*. at 21:45–55. Ultimately, "modulating" is a broad term that has not been redefined to exclude pulsing.

Accordingly, the Court construes "modulating at least one of the LEDs" and "modulating of at least one of the LEDs" as follows:

- "modulating at least one of the LEDs" means "varying the amplitude, frequency, or phase of the light produced by at least one of the LEDs to include information;" and
- "modulating of at least one of the LEDs" means "varying of the amplitude, frequency, or phase of the light produced by at least one of the LEDs to include information."

IV. CONCLUSION

The Court adopts the constructions above for the disputed and agreed terms of the Asserted Patents. Furthermore, the parties should ensure that all testimony that relates to the terms addressed in this Order is constrained by the Court's reasoning. However, in the presence of the jury the parties should not expressly or implicitly refer to each other's claim construction positions and should not expressly refer to any portion of this Order that is not an actual construction adopted by the Court.

It is so ORDERED.

SIGNED this 24th day of June, 2019.

ROBERT W. SCHROEDER III
UNITED STATES DISTRICT JUDGE