IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

CREE, INC.,	:	
Plaintiff,	:	
v.	:	Civil Action No. 10-866-RGA
SEMILEDS CORPORATION,	:	
Defendant.	:	

MEMORANDUM OPINION

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March 21, 2012

Wilmington, Delaware

ANDREWS, UNITED STATES DISTRICT JUDGE:

Plaintiff Cree, Inc. filed this action against Defendant SemiLEDs Corporation alleging infringement of United States Patent Numbers 7,737,459 ("'459"), 7,211,833 ("'833"), 7,611,915 ("'915"), 6,657,236 ("'236"), 7,795,623 ("'623"), and 7,557,380 ("'380"). All of the patents in this case involve semiconductor light emitting diode ("LED") technology used for general lighting purposes. The parties briefed their respective positions on claim construction, and the Court conducted a *Markman* hearing on the disputed terms. This Memorandum Opinion provides construction of the agreed upon and disputed terms.

I. The Legal Principles of Claim Construction

Claim construction is a question of law. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 977–78 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370, 388–90 (1996). When construing the claims of a patent, a court considers the literal language of the claim, the patent specification and the prosecution history. *Markman*, 52 F.3d at 979. Of these sources, the 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." *Phillips v. AWH Corporation*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005) (citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). However, "[e]ven when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using 'words or expressions of manifest exclusion or restriction.' " *Liebel–Flarsheim Co. v. Medrad*, Inc., 358 F.3d 898, 906 (Fed. Cir. 2004) (*quoting Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002)).

A court may consider extrinsic evidence, including expert and inventor testimony, dictionaries, and learned treatises, in order to assist it in understanding the underlying technology, the meaning of terms to one skilled in the art and how the invention works. *Phillips*, 415 F.3d at 1318–19; *Markman*, 52 F.3d at 979–80. However, extrinsic evidence is considered less reliable and less useful in claim construction than the patent and its prosecution history. *Phillips*, 415 F.3d at 1318–19 (discussing "flaws" inherent in extrinsic evidence and noting that extrinsic evidence "is unlikely to result in a reliable interpretation of a patent claim scope unless considered in the context of intrinsic evidence").

In addition to these fundamental claim construction principles, a court should also interpret the language in a claim by applying the ordinary and accustomed meaning of the words in the claim. *Envirotech Corp. v. Al George, Inc.*, 730 F.2d 753, 759 (Fed. Cir. 1984). If the patent inventor clearly supplies a different meaning, however, then the claim should be interpreted according to the meaning supplied by the inventor. *Markman*, 52 F.3d at 980 (noting that patentee is free to be his own lexicographer, but emphasizing that any special definitions given to words must be clearly set forth in patent). If possible, claims should be construed to uphold validity. *In re Yamamoto*, 740 F.2d 1569, 1571 (Fed. Cir. 1984).

II. Claim Constructions

A. U.S. Patent '459: High Output Group III Nitride Light Emitting Diodes

The parties agreed upon the constructions of various terms used in Patent '459 and the Court accepts them as detailed below for the purposes of this litigation. Because the terms of the '459 patent are not in dispute, there is no need to provide a technical background of the patent.

Claim Term or Phrase:	"Dominant wavelength"
Agreed upon Construction:	The color of an LED, typically expressed in nanometers. The dominant wavelength describes a measure of the hue sensation produced in the human eye by a light emitting diode.
Claim Term or Phrase:	"Area"
Agreed Upon Construction:	For a chip or die with different portions having different dimensions, the term "area" means the largest area of semiconductor or substrate material within the die or chip. Expressed in alternative fashion, but with the same meaning, the area is the larger of either (i) the largest semiconductor area in the diode or (ii) the substrate area of the diode

	that must or will be packaged.
Claim Term or Phrase:	"Radiant Flux"
Agreed Upon Construction:	The output of an LED, typically expressed in watts or milliwatts. The radiant flux, also referred to as the radiant power, is the rate (dθ/dt) at which the radiation field transfers radiant energy from one region to another, as measured by placing an encapsulated lamp in an integrating sphere attached to a spectrometer, or by some comparable method.

B. U.S. Patents '833 and '915: Light Emitting Diodes Including Barrier Layers/Sublayers

1. Technical Background

These two patents are considered together for the purposes of claim construction. The '915 patent is a "division" of the '833 patent. The underlying technology of these patents is intended to create brighter LEDs. To do so, the inventors included a "reflector layer" on the LED device to reflect more of the light generated within the LED in a useful direction. They also included an "ohmic contact layer" to improve the flow of current to the device. The "reflector layer" posed a problem, however, as it is often made of a silver metal prone to "migrate" onto the LED semiconductor layers over time. The bonding materials of the LED itself also "migrate" back on to the "reflector layer" and "ohmic contact layer." Known as "metal migration," this phenomenon results in short circuits and degraded LED performance. These inventions attempt to solve this problem with the addition of a "conductive barrier layer" placed directly on the "reflector layer" and the "ohmic contact layer" sidewalls to block the "metal migration" as much as possible. Together, these three layers are known as the "multilayer conductive stack." Cree asserts claims 1, 2, 20, 22, and 23 of the '833 patent and claims 1, 2, and 12 of the '915 patent in this action.

2. "Sidewall"

Agreed Upon Construction:	The side or edge wall of a layer.

"Sidewall" is a term appearing in claims 1, 2, 20, 22 and 23 of the '833 patent and claims 1, 2 and 12 of the '915 patent. The parties agree upon the construction of the term "sidewall" and the Court accepts the construction for the purposes of this litigation.

3. "Layer"

Cree's Proposed Construction:	This term has a well understood meaning and does not require construction by the Court.
SemiLEDs Proposed Construction:	A continuous thickness of matter spread over a surface.
Construction of the Court:	This term has a well understood meaning and does not require construction by the Court.

The parties dispute the construction of the term "layer" as it appears in claims 1, 2, 20, 22 and 23 of the '833 patent and claims 1, 2 and 12 of the '915 patent. Cree proposes that "layer" has a plain and well understood meaning and requires no construction. SemiLEDs proposes construing "layer" as "a continuous thickness of matter spread over a surface." "Layer" is not explicitly defined by the specifications. At oral argument, it became clear that the main point of disagreement is whether or not "layer" must be described as "continuous." Cree argues that a "layer" can be continuous or discontinuous and nothing in the patent requires complete continuity. SemiLEDs counters that an ordinary person skilled in the art would define all "layers" at least 25 angstroms in thickness as "continuous" absent explicit instruction otherwise. SemiLEDs concludes that because all "layers" in the '833 patent specification are at least 25 angstroms thick, "layer" should be construed as "continuous."

The term "continuous" does not appear anywhere within the patents and the Court is disinclined to read the limiting term of "continuous" into the claims without justification in the specifications. The Court is also mindful of the *Phillips* warning against confining claim terms to a patent's preferred embodiments. 415 F.3d at 1323. SemiLEDs justifies defining "layer" as "continuous" because no embodiment explicitly describes a layer that is lesser than 25 angstroms in thickness. While it is true that no layer thinner than 25 angstroms is explicitly described in the specifications, nothing in the specifications expressly rules out a thinner layer of, for example, 23 or 24 angstroms. In fact, the specifications describe at least one layer measured at "about" 25 angstroms thick.[1] Such language of approximation contemplates a layer slightly thicker or thinner than 25 angstroms. Therefore, a thinner layer of 24 angstroms would surely stand as part of the invention as understood by the inventor, but would not be "continuous" according to SemiLEDs' definitional requirement of 25 angstroms. The layer 24 angstroms thick would fall outside SemiLEDs' construction even though it is clearly contemplated by the specifications.

Moreover, imposing the "continuous" requirement into the construction of "layers" is not consistent with the treatment of the term by the extrinsic evidence. Patent '380, although extrinsic to the '833 and '915 patents, plainly uses the term "layer" to describe a metal contact less than ten angstroms thick with no mention of continuity or discontinuity.[2] Likewise, SemiLEDs' own patent, while not under construction in this case, defines the term "layer" as having a thickness of 1 angstrom without any limitation.[3] For these reasons, the Court will not impose "continuous" into the construction. The Court also agrees with Cree that "layer" is a common and non-technical term with a well-understood meaning. Because construction will not provide any additional clarity to the jury's decision making process, the Court will not construe "layer" and will allow the jury to apply the ordinary meaning of the word.

4. "Reflector Layer"

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[1] "If the ohmic layer [] comprises [platinum], it is about 25 [angstroms] thick, in some embodiments of the present invention." Patent '833 at 8:13-15.

[2] Patent '380 at 6:52.

[3] SemiLEDs' U.S. Patent No. 7,615,789 at 4:26-28.

Cree's Proposed Construction:	A layer that reflects light generated by the active region of the LED.
SemiLEDs Proposed Construction:	A layer of material with a reflective surface.
Construction of the Court:	A layer that reflects light generated by the active region of the LED.

The construction of the term "reflector layer" as used in claims 1, 2, 20, 22 and 23 of the '833 patent and claims 1, 2 and 12 of the '915 patent is disputed by the parties. Cree proposes "a layer that reflects light generated by the active region of the LED," while SemiLEDs counters with "a layer of material with a reflective surface." Cree argues that its construction more accurately captures the function and purpose of the "reflector layer." SemiLEDs insists that Cree's construction is too transient and indefinite, as the layer in question would fall within the construction depending on whether light is actually being reflected, i.e., the layer would no longer be a "reflector layer" when the LED is turned off. SemiLEDs argues that its construction avoids these problems.

SemiLEDs' construction would broadly include all layers with a reflective surface, conceivably encompassing layers not designated as *the* "reflector layer" by the inventors. Cree's construction is supported by the specifications, as the "reflector layer" is the only layer described with the specific purpose to reflect light generated from the device to improve light extraction. *See* Patent '833 at 5:04-05. Other layers in the LED may have a reflective quality, but they do not have the specific purpose to reflect light. SemiLEDs' own dictionary citation supports Cree's construction. (D.I. 120, p. 37). The dictionary defines reflector as "a surface that reflects light."[4] Here, it is undisputed that the "surface" is a layer. Therefore, Cree's construction of "a layer that reflects light" is consistent with SemiLEDs' own dictionary.

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[4] Kaplan, *Wiley Electrical and Electronics Engineering Dictionary* at Page 64: "reflector 1. An object, material, device, or system utilized to reflect images, sound, heat, particles, waves, or the like. 2. A surface that reflects light."

The only remaining dispute is whether the language "generated by the active region from the LED" should be included in the construction. The Court agrees with Cree that this descriptive language best captures the purpose and function of the "reflector layer." The specifications state that the "reflector layer's" purpose is to "improve light extraction from the device." Patent '833 at 4:67-5:05. For this purpose to be fulfilled, the "reflector layer" must "reflect light generated by the LED's active region." There is no other function the "reflector layer" is designed to serve within the LED. SemiLEDs' argument that Cree's definition is too transient, because it depends on the "reflector layer" in the active state of doing its intended job, is not persuasive. Even when the LED is inactive, it is appropriate English usage to say that the "reflector layer" is "a layer that reflects light generated by the active region of the LED."

5. "Ohmic Contact Layer"

Cree's Proposed Construction:	A layer that allows current to pass from a metal material to a semiconductor material with low resistance.
SemiLEDs Proposed Construction:	A layer of material where conduction through the contact between the semiconductor region and the material obeys Ohm's law.
Construction of the Court:	A layer that allows current to pass from a metal material to a semiconductor material with low resistance.

The parties dispute the construction of "ohmic contact layer" as used in claims 1, 2, 20, 22 and 23 of the '833 patent and claims 1, 2 and 12 of the '915 patent. Cree proposes "a layer that allows current to pass from a metal material to a semiconductor material with low resistance." SemiLEDs counters with "a layer of material where conduction through the contact between the semiconductor region and the material obeys Ohm's law." The main disagreement is whether the term should be construed as a contact of "low resistance" or one that "obeys Ohm's law."[5] The '833 patent's specification does not define "ohmic contact layer."

[5] SemiLEDs defines Ohm's law as "the current in an electric circuit is inversely proportional to the resistance of the circuit and is directly proportional to the electromotive force in the circuit." (D.I. 118, p. 8, citing *IEEE 100* at 757.)

Both parties provide technical dictionaries in support of their respective constructions. [6] Cree provides a deposition of SemiLEDs' own witness agreeing that an "ohmic contact" is an element with "low resistance."[7] Cree asserts that the "ohmic" of "ohmic contact" does not necessarily signify "Ohm's law," as an ohm is a unit of electrical measurement. Further, because nothing perfectly complies with Ohm's law in the real world, it may be impossible for any contact to fall within SemiLEDs' construction. Cree is also concerned that SemiLEDs' construction would result in the inconsistency of encompassing high resistance contacts, so long as they obey Ohm's law, when the purpose of the contact is to provide a contact of low resistance. Cree provides specifications of the extrinsic '623 patent, as well as a SemiLED patent application[8] in support, as both specifically define an "ohmic contact" as a contact of "low resistance." [9] SemiLEDs counters that Cree's construction perversely encompasses contacts that do not follow Ohm's law, so long as the contacts are of low resistance. SemiLEDs counters Cree's deposition evidence with its own deposition of a Cree inventor who agreed that an "ohmic contact" is "a metal contact that conducts current which behaves according to Ohm's law."[10] SemiLEDs also argues that Cree's construction is vague and provides no guidance for what counts as "low resistance."

When a specification's definition of a claim term is lacking, extrinsic evidence may become more persuasive in defining the claim term, but the Court must take special care to ensure that the extrinsic evidence is consistent with the patentee's own description of the invention. *See, e.g. Mass. Inst. of Tech. v. Abacus Software*, 462 F.3d 1344, 1351 (Fed. Cir. 2006). Both parties bring forth evidence in the form of technical dictionaries, depositions, and sound argumentation justifying their respective constructions. Only Cree, however, brings forth a closely related patent with a specification in direct support of its construction. The '623 patent defines an "ohmic contact layer" by a formula of resistance. This formula

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[6] SemiLEDs cites *Wiley's Electrical and Electronics Engineering Dictionary* at p. 525 defining ohmic contact as "a contact between two materials in which an increase in voltage results in an increase in current, as dictated by Ohm's law." (D.I. 118, p.9). Cree in turn cites *VLSI Technology*, *The Physics of Semiconductors* and *Semiconductor Integrated Circuit Processing Technology* in support of its "low resistance" construction. (D.I. 129, p.5).
[7] Deposition of Erchuk, Tr. at 88 (D.I. 184, p. 20).
[8] SemiLEDs' Patent App. Number 2008/0035950 at p. 45.
[9] Cree also points out that an "ohm" is a measure of electrical resistance and is not defined by Ohm's law.
[10] Deposition of DenBaar, Tr. at 61 (D.I. 132, Ex. 19).

requires the "ohmic contact layer" to be of "low resistance."[11] The '623 patent pertains to the same type of contact construed here, within the context of the same technology, and was created only three years subsequent by some of the same inventors of the '833 patent.[12] For these reasons, it is especially persuasive extrinsic evidence. The Court finds this evidence persuasive and adopts Cree's construction of "Ohmic contact layer" as "a layer that allows current to pass from a metal material to a semiconductor material with low resistance."

6. "Conductive Barrier Layer"

Cree's Proposed Construction:	A conductive layer that acts as a barrier to reduce migrations between other layers.
SemiLEDs Proposed Construction:	A conductive layer that prevents migration of undesired materials to or from the reflector layer.
Construction of the Court:	A conductive layer that acts as a barrier to reduce migrations between other layers.

The term "conductive barrier layer" is disputed as used in claims 1, 2, 20, 22 and 23 of the '833 patent and claims 1, 2 and 12 of the '915 patent. Cree proposes that "conductive barrier layer" means "a conductive layer that acts as a barrier to reduce migrations between other layers." SemiLEDs counters with "a conductive layer that prevents migration of undesired materials to or from the reflector layer." The chief disagreement is whether the "barrier layer" is best described as a layer that completely "prevents" metal migration or as a layer that simply "reduces" metal migration. Cree justifies "reduces" with cites to specifications. SemiLEDs responds that the word "reduces" is excessively vague, as any layer that reduces migration even a very small amount would fall within the claim. SemiLEDs also argues

[11] "As used herein the term 'ohmic contact' refers to a contact with a specific contact resistivity of less than about 10 e-03 ohm-cm^2 and, in some embodiments less than about 10 e-04 ohm-cm^2. Thus, a contact that is rectifying or that has a high specific contact resistivity, for example, a specific contact resistivity of greater than about 10 e-03 ohm-cm^2, is not an ohmic contact as that term is used herein." '623 patent at 10:37-44.

[12] David B. Slater, Jr. and John A. Edmond are inventors of both patents.

the term "barrier" necessarily implies a complete prevention of metal migration and does not leave room for a partial hindrance of migration.

SemiLEDs' argument that the term "conductive barrier layer" does not include mere reduction in metal migration conflicts with the intrinsic evidence. As pointed out by Cree, the specifications repeatedly state that the "conductive barrier layer" may only "reduce" metal migration. For example, patent '833 states at 3:17 that "[o]ther embodiments of the invention provide methods of reducing migration of metal…by forming a barrier layer on the reflector layer that extends on the reflector layer sidewall." At 12:35-38, the specification states that "the barrier layer and/or the passivation layer may also serve to retard or inhibit unwanted migration of metal along the edge of the metal stack." The terms "retard or inhibit" are more consistent with "reduces" than the absolute term "prevents." The barrier layer also may form undesirable "cracks" providing a path for migration, indicating that the barrier layer is not impenetrable. *Id.* at 13:55-60. There is more support for Cree's interpretation at 3:07 and 4:43 of the '833 patent.

While the goal of the "conductive barrier layer" is surely to reduce migration as close to complete prevention as possible, the above specifications reflect that the claims cover a "barrier layer" that achieves less than perfect results. Requiring the "barrier layer" to completely "prevent" migration would exclude the patent's embodiments without justification. Further, "reduces" is not so inherently vague as to justify exclusion from the claim construction when its inclusion is clearly supported by the specifications. *See On-Line Techs., Inc. v. Bodenseewerk Perkin-Elmer GmbH*, 386 F.3d 1133, 1138 (Fed. Cir. 2004); *Playtex Products, Inc. v. Procter & Gamble Co.*, 400 F.3d 901, 908 (Fed. Cir. 2005). For all these reasons, the Court adopts Cree's construction of "conductive barrier layer" as "a layer that acts as a barrer to reduce migrations between other layers."

7. **"Directly On"**

Cree's Proposed Construction:	Positioned above, below, or to the side of, with no intervening elements.
SemiLEDs Proposed Construction:	Covering with no intervening elements present.
Construction of the Court:	Covering with no intervening elements present.

The parties dispute construction of the term "directly on" as used in claims 1, 2, 20, 22 and 23 of the '833 patent and claims 1, 2 and 12 of the '915 patent. Cree proposes "positioned above, below, or to the side of, with no intervening elements," while SemiLED offers "covering with no intervening elements present." Claim 1 of the '833 patent states that the conductive barrier layer is "directly on the reflector layer and extend[s] directly on the reflector layer sidewall and directly on the ohmic contact layer sidewall."[13] The primary dispute is whether "directly on" should be construed to mean the barrier layer is necessarily "covering" the reflector layer and the sidewalls of the reflector and ohmic layers.

Cree argues that "directly on" does not mean "covering" entirely and points to specifications defining "directly on" as one element on another element with "no intervening elements present." '833 Patent at 4:07-09. Those specifications do not use the word "covering." SemiLEDs, however, points to specifications fully illustrating the barrier layer's location as part of the multilayer conductive stack. The specifications indicate that when the barrier layer is deposited, it completely envelops the top of the reflector layer and extends down to surround the sidewalls of the reflector and ohmic layers:

> In order to limit migration of the mirror metal to the mesa, according to some embodiments of the invention, it may be desirable to extend the barrier layer over the sidewalls of the reflector layer, as illustrated in FIG. 13...Thus, when barrier layer is formed, e.g., deposited, it may contact the sidewalls of the reflector layer and ohmic contact as well as a portion of the surface of mesa surrounding the ohmic contact and reflector layer."

Id. at 13:42-54. In Claim 1, the barrier layer is "directly on" the reflector layer and the reflector and ohmic layer sidewalls; it necessarily contacts the sidewalls of the reflector and ohmic contact layer as described in the above specifications. The barrier layer thus completely envelops the reflector layer and the ohmic and reflector layer sidewalls. This description of the barrier layer's contact with the sidewalls of the reflector layer and ohmic contact layer is indistinguishable from "covering." The specifications then go further in describing the barrier layer as "covering" the sidewalls of the reflector layer: "If the barrier layer is formed in such a way as to cover the sidewalls of a reflector layer as illustrated in FIG. 13, it is possible for cracks in the barrier layer to form near the sidewalls of the reflector layer." *Id.* at 13:55-58. This specification describes claim 1, which describes the barrier layer as extended "directly on" the reflector layer's sidewalls. This is not an example of reading a limitation from the embodiment into the claim language; it is an example of an embodiment providing a precise description of the only conceivable physical arrangement of the claim. The Court adopts SemiLEDs' construction of "directly on" as "covering with no intervening elements present."

B. U.S. Patent '236: Enhanced Light Extraction in LEDs through the Use of Internal and External Optical Elements

1. Technical Background

The '236 patent also concerns methods of increasing light extraction from the LED. This patent utilizes two technologies: "light extraction structures" and "spreader layers." "Light extraction structures" alter the surface of the LED. The altered surface provides increased opportunity for light traveling at different angles or indexes of infraction to escape the LED. "Spreader layers" are made of a conductive material distributed across the LED chip. This material creates a more uniform current injection, resulting in increased light output. Previously, the nature of these two technologies made it difficult to combine them within the same device. Patent '236 provides new and improved designs to use both "light extraction structures" and "spreader layers" within the same LED for increased performance. Cree asserts claims 1, 2, 4, 5, 7, 13, 20, 21, 23, 24, and 27 of the '236 patent.

2. "LED Structure"

[13] These three layers together are known as the "multilayer conductive stack."

Agreed Upon Construction:	A structure having at least an epitaxially grown p-type layer, an epitaxially grown n-type layer, and an epitaxially grown active layer between the p-type and the n-type layer.

"LED structure" is a term appearing in claims 1, 2, 4, 5, 7, 13, 20, 21, 23, 24, and 27 of the '236 patent. The parties agree upon the construction of the term "LED structure" as described above and the Court accepts the construction for the purposes of this litigation.

3. "Adjacent to"

Agreed Upon Construction:	Near or next to.

"Adjacent to" is a term appearing in claims 1, 2, 4, 5, 7, 13, 20, 21, 23, 24 and 27 of the '236 patent. The parties agree upon the construction of the term "adjacent to" as described above and the Court accepts the construction for the purposes of this litigation.

4. **"Light Extraction Structures"**

Cree's Proposed Construction:	Features that provide surfaces for reflecting, refracting, or scattering the light generated by the active region of the LED to increase the light extracted from an LED.
SemiLEDs Proposed Construction:	Structures on or within an LED made of different material than the LED that provide a spatially varying index of refraction and surfaces to allow light trapped within an LED to refract or reflect and escape. Light extraction structures do not include random or ordered roughening, texturing or rough etching of a surface layer of a substrate or the epitaxial layers of an LED.
Construction of the Court:	Features that provide surfaces for reflecting, refracting, or scattering the light generated by the active region of the LED to increase the light extracted from an LED.

The parties dispute the construction of the term "light extraction structures" as used in claims 1, 2, 4, 5, 7, 13, 20, 21, 23, 24, and 27 of the '236 patent. Cree proposes "features that provide surfaces for reflecting, refracting, or scattering the light generated by the active region of the LED to increase the light extracted from an LED." SemiLEDs prefers "structures on or within an LED made of different material than the LED that provide a spatially varying index of refraction and surfaces to allow light trapped within an LED to refract or reflect and escape. Light extraction structures do not include random or ordered roughening, texturing or rough etching of a surface layer of a substrate or the epitaxial layers of an LED." There are two primary disputes here: 1) whether or not the "light extraction structures" must be of a different material than the LED and 2) whether or not "light extraction structures" include random or ordered roughening, texturing, or rough etching.

SemiLEDs argues that basic physics requires the "light extraction structures" to be of a different material than the LED; otherwise, producing different indices of refraction is impossible. SemiLEDs quotes the "Summary of the Invention" in support: "The [light extraction] structures provide a spatially varying index of refraction and provid[e] surfaces to allow light trapped within the LED to refract or reflect and escape." *Id.* at 3:64-4:01. According to SemiLEDs, the "light extraction structures" can only provide a "spatially varying index of refraction" if the "light extraction structures" are of a different material than the LED.

The specification does not go so far. First, the "Summary of the Invention" does not identify the LED itself as the component from which the "light extraction structures" must provide a spatially varying index. Nor do they require the "light extraction structures" to be of a different material than the LED. Where the specification does identify components that should provide different indices of refraction from the "light extraction structure," the specification identifies the LED's surrounding epoxy[14] and the second spreader material.[15] It does not identify the LED itself.

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[14] Cree cites (D.I. 129, p.8) the following: "To increase their effectiveness, the [light extraction elements] should have a higher index of refraction than the LED encapsulating material." '236 patent at 5:61-65.

[15] "The [light extraction element] material must be of a different index of refraction [] than the second spreader material [] to provide reflections and refractions that can redirect normally trapped light into a direction that allows the light to escape from the LED." *Id.* at 7:44-48.

Further, Cree persuasively argues that "light extraction structures" can accomplish their goals by either varying the indices of refraction or by varying the angles at which light hits them; the latter can be done even if the "structures" are the same material as the LED.[16] To further undermine SemiLEDs' line of reasoning, the specification clearly contemplates "light extraction structures" made of GaN, the same material often used to create the LED semiconductors.[17] The presumption of claim differentiation provide an additional reason to reject SemiLEDs' construction, as dependent claims 10, 12, and 16 are added to specifically require "light extraction structures" that have "a different index of refraction than said LED layers." If the independent claim required the light extraction structures to be of a different index of refraction than the LED layers, these dependent claims would serve no purpose. When SemiLEDs asks for the limitation requiring "light extraction structures" to be of a different material than, or have a spatially varying index from, the LED device as a whole, SemiLEDs asks the Court to make an inferential leap that is not justified by the specification. For all these reasons, the Court will not adopt the construction that "light extraction structures" must be of a different material from the LED or must provide a spatially varying index from the LED.

The second disagreement is whether the applicant disclaimed the "Schnitzer" method of roughening, texturing or rough etching a surface in order to increase light extraction in the '236 patent itself. Statements distinguishing prior art must be sufficiently clear to warrant a narrowing construction. *Ventana Med. Sys., Inc. v. Biogenex Labs., Inc.,* 473 F.3d 1173, 1180-81 (Fed. Cir. 2006). SemiLEDs cites the following:

> [O]ne disadvantage of surface texturing is that it can prevent effective current spreading in LEDs … ['236 patent at 1:58 to 2:22.]
>
> By using a surface material to form the light disperser layer the problems of patterning roughness into the semiconductor surface are eliminated, providing an advantage over the work of Schnitzer. [*Id.* at 4:34-37.]

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[16] The "Schnitzer" reference contemplates "light extraction structures" patterned directly into the LED material itself, meaning they are of the same material as the LED. *See* '236 Patent at 1:58-2:03.
[17] LED semiconductors can be made of "GaN." *Id.* at 2:08. The specification notes "GaN" light extraction elements at 6:35.

> The embodiments presented here are improvements to the LED described and demonstrated by Schnitzer, et al. They offer the advantage of not having to etch the disperser layer into the semiconductor material." [*Id.* at 9:10-16.]

(D.I. 118, at 15). An applicant's general criticism of a prior art's shortcomings should not necessarily be read as an outright disclaimer of the prior art's methods. *Ventana Medical Syst.*, *supra*, 473 F.3d at 1180. The applicant does discuss some of the shortcomings of the "Schnitzer" methods of light extraction. The applicant does not, however, categorically reject them. The applicant instead compares the '236 patent favorably with "Schnitzer" by virtue of the success of combining the "Schnitzer" light extraction methods with current spreading. '236 Patent at 3:57-4:09. The specification clearly describes "light extraction structures" created by the same "Schnitzer" methods: "reactive ion etching" at 6:45-48, "dry etching" at 7:22-34 and roughened surfaces at 10:04-09. Finding a "Schnitzer" disclaimer would eliminate these preferred embodiments from the patent, something the court is reluctant to do absent clear and manifest disclaimer. Claim differentiation again argues against finding for SemiLEDs in this construction, as dependent claims 11 and 26 explicitly call for the "Schnitzer" methods of light extraction structures formed by "roughening." For all these reasons, the Court declines to find a disclaimer of the "Schnitzer" method and will adopt Cree's construction of "light extraction structures."

5. **"Spreader Layer"**

Cree's Proposed Construction:	A layer that spreads current across an LED so that the current is efficiently injected into the active layer.
SemiLEDs Proposed Construction:	A layer of a conductive or semiconductor material located outside the LED structure that spreads current across the plane of the device.
Construction of the Court:	A layer of a conductive or semiconductive material that spreads current across the plane of the device so that the current is efficiently injected into the active layer.

The parties dispute the construction of "spreader layer" as used in claims 1, 2, 4, 5, 7, 13, 20, 21, 23, 24 and 27 in patent '236. Cree proposes "a layer that spreads current across an LED so that the current is efficiently injected into the active layer." SemiLEDs prefers "a layer of a conductive or semiconductive material located outside the LED structure that spreads current across the plane of the device." The primary disputes are 1) whether or not the spreader layer must be "outside" the LED structure and 2) whether the construction should include "spreader layer's" purpose that the "current is efficiently injected into the active layer."

Cree argues that the inclusion of "outside" in the construction is confusing and not supported by the specification, and claim 1 itself provides the spreader layer's location as "adjacent" to (meaning near or next to) the LED. Cree justifies the inclusion of the "spreader layer's" purpose of "efficient injection" to differentiate this layer from other layers that do spread some current, but not in the same manner or to the same extent as the "spreader layer." SemiLEDs argues that "outside" is supported by the structure of the claim. Claim 1 states that the LED is constructed of three layers with each "spreader layer" adjacent to and on opposite sides of the LED. SemiLEDs also argues that the "efficiently injected" language is hopelessly vague and should be omitted from the construction.

The Court adopts a different construction, one that is closer to Cree's proposal than SemiLEDs'. The specification describes a "spreader layer" in the "Summary of the Invention" section at 3:61-64: "The spreader layers are semiconducting or conducting layers that distribute current across the plane of the device so that current is efficiently injected into the active layer." As SemiLEDs points out, "statements that describe the invention as a whole are more likely to be found in certain sections of the specification, such as the Summary of Invention." *See C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 864 (Fed. Cir. 2004).

When an encompassing definition is provided within the specification applicable to all of the patent's embodiments, the Court finds no compelling reason to further modify or limit the claim term. The Court is not persuaded by SemiLEDs' stance that construing the "spreader layer" in light of its purpose to efficiently inject current into the active layer is prohibitively vague. To the contrary, it more precisely distinguishes the "spreader layer" from LED layers that do not have the same specialized purpose but may spread current to some degree. Finally, the Court sees no need to limit the spreader layer as "outside" the LED, as that word is not within the specification or claim language. The claims describe each "spreader layer" as "adjacent" and on "opposite" sides of the LED and sufficiently describe the layers' locations.

C. Patent '623: Light Emitting Devices Having Current Reducing Structures and Methods of Forming Light Emitting Devices Having Current Reducing Structures

1. Technical Background

The '623 patent also details a technology for increasing light extraction from LEDs. LED chips are typically powered through a wire attached to a surface bond pad. The bond pads are not transparent and thus absorb light generated by the LED. The '623 patent alleviates this problem by creating a "reduced conductivity area" in the light generating region of the LED directly opposite the bond pad. By reducing current to this region, the current is redirected to other parts of the LED more likely to produce light that will not be blocked by the bond pad. Cree has asserted claims 23, 24, 27 and 28 of the '623 patent.

2. "Non-transparent feature"

Agreed Upon Construction:	A feature, such as a wire bond pad, that blocks light.

"Non-transparent feature" is a term appearing in claims 23, 24, 27 and 28 of the '623 patent. The parties agree upon the construction of the term "non-transparent feature" as described above and the Court accepts the construction for the purposes of this litigation.

3. "Ohmic Contact"

Cree's Proposed Construction:	A contact that allows current to pass from a metal material to a semiconductor material with low resistance.
SemiLEDs Proposed Construction:	A layer of material where conduction through the contact between the semiconductor region and the material obeys Ohm's law.
Construction of the Court:	A contact that allows current to pass from a metal material to a semiconductor material with low resistance.

The question of whether an "ohmic contact" should be construed as "low resistance" or as a contact that "obeys Ohm's law" arises again in claims 23, 24, 27 and 28 of the '623 patent. Both sides offer constructions essentially identical to those offered for "ohmic contact layer" in the '833 patent. Cree proposes "a contact that allows current to pass from a metal material to a semiconductor material with low resistance," while SemiLEDs prefers "a layer of material where conduction through the contact between the semiconductor region and the material obeys Ohm's law."

The Court's construction of "ohmic contact" in this patent does not require an inquiry into the extrinsic evidence, unlike the construction of "ohmic contact layer" in the '833 patent. "Ohmic contact" is defined in the specification at 10:37-44:

> As used herein the term 'ohmic contact' refers to a contact with a specific contact resistivity of less than about 10 e-03 ohm-cm^2 and, in some embodiments less than about 10 e-04 ohm-cm^2. Thus, a contact that is rectifying or that has a high specific contact resistivity, for example, a specific contact resistivity of greater than about 10 e-03 ohm-cm^2, is not an ohmic contact as that term is used herein.

The specification does not define "ohmic contact" in relation to Ohm's law; it is defined according to its resistance. There is no dispute that a contact resistivity less than 10 e-03 ohm-cm^2 is "low resistance." This definition was influential as extrinsic evidence in construing "ohmic contact" in the '833 patent, and being intrinsic to the '623 patent claim, it is dispositive. The Court thus adopts Cree's construction of "ohmic contact" as "a contact that allows current to pass from a metal material to a semiconductor material with low resistance."

4. "Non-Ohmic Contact"

Cree's Proposed Construction:	A contact that provides high resistance to current passing from a metal material to the semiconductor material.
SemiLEDs Proposed Construction:	A contact that does not conduct current to the semiconductor region.
Construction of the Court:	A contact that provides high resistance to current passing from a metal material to the semiconductor material.

The term "non-ohmic contact" is used in claims 27 and 28 of the '623 patent. Cree proposes "a contact that provides high resistance to current passing from a metal material to the semiconductor material," while SemiLEDs offers "a contact that does not conduct current to the semiconductor region." This dispute boils down to whether the "non-ohmic contact" should be defined as a contact of "high resistance" or as "a contact that does not conduct current." SemiLEDs' proposal is ruled out by the specification. The specification explicitly states that the "non-ohmic contact" may only "reduce" current injection. *See* 10:46-52. This refutes SemiLEDs' proposal that non-ohmic contacts be construed as completely eliminating current injection. This is also supported by the title of the patent as "reduced conductivity regions," not "no conductivity regions." In addition, the '623 patent defines contacts according to resistivity at 10:41-44:

> Thus, a contact that is rectifying or has a high specific contact resistivity, for example, a specific contact resistivity of greater than about 10 e-03 ohm-cm^2, is not an ohmic contact as that term is used herein.

The specification defines "not an ohmic contact" as a contact that has high specific resistivity. The court has no reason to conclude "not an ohmic contact" is different than a "non-ohmic contact." Cree's construction of non-ohmic contact as "a contact that provides high resistance to current passing from a metal material to the semiconductor material" is thus adopted by the court.

5. "A Metal Contact on a Surface of the p-Type Semiconductor Layer Opposite the n-Type Semiconductor Layer, wherein the Metal Contact Forms on Ohmic Contact to the p-Type Semiconductor Layer in a Region other than a Reduced Conductivity Area of the Surface of the p-Type Semiconductor Layer that is Aligned with the Non-Transparent Feature."

Cree's Proposed Construction:	The metal contact is located on a surface of the p-type semiconductor layer and forms an ohmic contact that allows current to pass from the metal contact to the p-type semiconductor layer in an area other than a reduced conductivity area of the surface of the p-type semiconductor layer that is underneath the non-transparent feature (e.g. underneath the wire bond pad), such that there is no ohmic contact in the reduced conductivity area of the surface of the p-type semiconductor layer.
SemiLEDs Proposed Construction:	SemiLEDs does not agree that this long term is amenable to construction, and argues it should be broken into its distinct parts for construction.
Construction of the Court:	The Court agrees that this term is too cumbersome to be construed all at once and should be construed by its distinct parts.

Cree proposes the following definition for this long term in asserted claims 23, 24, 27 and 28:

> The metal contact is located on a surface of the p-type semiconductor layer and forms an ohmic contact that allows current to pass from the metal contact to the p-type semiconductor layer in an area other than a reduced conductivity area of the surface of the p-type semiconductor layer that is underneath the non-transparent feature (e.g. underneath the wire bond pad), such that there is no ohmic contact in the reduced conductivity area of the surface of the p-type semiconductor layer.

SemiLEDs argues that this term is not amenable to a single construction and instead construes it by its distinct phrases. The Court agrees with SemiLEDs on this point and will analyze the term phrase by phrase.

i. "Wherein the Metal Contact Forms on Ohmic Contact"

Cree's Proposed Construction:	The metal contact forms an ohmic contact that allows current to pass from the metal contact to the p-type semiconductor layer.
SemiLEDs Proposed Construction:	Indefinite
Construction of the Court:	The metal contact forms an ohmic contact that allows current to pass from the metal contact to the p-type semiconductor layer.

The question in construing this term is whether it can be construed at all. Cree admits that "wherein the metal contact forms on ohmic contact" contains a typographical error. Cree suggests the patentee intended "wherein the metal contact forms *an* ohmic contact." Cree also argues that "forms on ohmic contact" has the same meaning as "forms an ohmic contact," rendering the typo meaningless. Cree further argues that if the Court does not agree that "forms on ohmic contact" is a meaningless typo, the Court should correct the sentence to say "forms an ohmic contact," as this is the sentence's only reasonable construction. SemiLEDs argues that "forms on ohmic contact" is hopelessly indefinite, as it has at least three possible meanings: (1) a metal contact on an ohmic contact; (2) a metal contact that forms something unspecified on an ohmic contact; or (3) an ohmic metal contact. If the Court were interpreting the claim in a vacuum, SemiLEDs would be correct. There would be no context or baseline to measure the claim against in order to determine the definite intended meaning. Claim definiteness, however, is not analyzed in a vacuum, but always in light of the specification and drawings of the patent, as well as the teachings of the prior art and of the particular application disclosure. *CBT Flint Partners, LLC v. Return Path, Inc.*, 654 F.3d 1353, 1359 (Fed. Cir. 2011); *see also Ultimax Cement Manufacturing Corp. v. CTS Cement Manufacturing Corp.*, 587 F.3d 1339, 1353 (Fed. Cir. 2009).

A court only has the power to correct a patent if "(1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different prosecution of the claims." *CBT Flint Partners*, 654 F.3d at 1359. The court should not engage in "guesswork" to make sense of the patent claim. *Id.* If, however, an individual skilled in the art would be reasonably sure as to its intended meaning, the claim should be corrected. *Id.*

The specific language at issue should be interpreted within the context of the entire paragraph of claim 23:

> a metal contact on a surface of the p-type semiconductor layer opposite the n-type semiconductor layer, wherein the metal contact forms on ohmic contact to the p-type semiconductor layer in a region other than a reduced conductivity area of the surface of the p-type semiconductor layer that is aligned with the non-transparent feature.

There is no dispute that the claim envisions "a metal contact on a surface of the p-type semiconductor layer." The question is whether this "metal contact" can be reasonably construed as a contact completely different from the "ohmic contact." Two of SemiLEDs' alternative interpretations depend on understanding "a metal contact" as something distinct from the "ohmic contact."[18] If the "ohmic contact" is the same contact as the "metal contact on a surface of the p-type semiconductor," rewriting the sentence "wherein the metal contact forms 'an' ohmic contact" is the only reasonable interpretation, as there is no possibility of an additional contact "forming on" the ohmic contact.

Figure 7A illustrates a preferred embodiment of claim 23. The relevant specification provides "a patterned ohmic contact is formed on a surface of the p-type semiconductor layer opposite the n-type semiconductor layer." '623 patent at 13:67-14:03. The specification indicates that the ohmic contact is the only metal contact "formed on a surface of the p-type semiconductor" anticipated by claim 23.[19] The Figure 7A illustration supports this interpretation, as it depicts no additional metal contacts or any other structures on top of the ohmic contact. There is no "metal contact" stacked on top of the ohmic contact as posited by SemiLEDs' first alternative construction. Likewise, there is no other formation sandwiched between a metal contact and the ohmic contact consistent with SemiLEDs' second alternative interpretation. If claim 23 were written to require a metal contact on top of the ohmic contact, or a metal contact on top of some other structure on top of the ohmic contact, this would be reflected somewhere in the specification and illustrations. Thus, a person skilled in the art would read claim 1 to mean "the metal

[18] SemiLEDs offers either (1) a metal contact on an ohmic contact or (2) a metal contact that forms something unspecified on an ohmic contact. Both of these possible interpretations require the metal contact to be a formation distinct from the ohmic contact.

[19] The non-ohmic contact depicted on the p-type semiconductor layer in FIG. 7A is specifically added in dependent claims 27 and 28. The principle of claim differentiation supports this contact as not being the additional metal contact alleged by SemiLEDs. Moreover, it is situated inside the ohmic contact, not "on" the ohmic contact, so it cannot be the contact proffered in SemiLEDs' interpretations.

contact forms an ohmic contact." The Court does not find this to be subject to reasonable debate. The Court will correct this claim language and adopt the construction proposed by Cree.

ii. "Is Aligned with the Non-Transparent Feature"

Cree's Proposed Construction:	Is underneath the non-transparent feature.
SemiLEDs Proposed Construction:	The outer edges of the reduced conductivity area and the outer edges of the non-transparent features are congruent.
Construction of the Court:	Is generally aligned with the non-transparent feature.

The parties dispute the construction of "is aligned with the non-transparent feature." Cree offers as part of its larger construction "is underneath the non-transparent feature," while SemiLEDs proposes "the outer edges of the reduced conductivity area and the outer edges of the non-transparent feature are congruent." The primary dispute here is whether the reduced conductivity area must have its edges exactly aligned with the edges of the wire bond pad, or whether the reduced conductivity area may be construed as merely underneath the wire bond pad.

Cree accurately points to embodiments that allow for the reduced conductivity region to be slightly smaller or slightly larger than the bond pad. The embodiments state that the "reduced conductivity region may be generally aligned with the bond pad," "the reduced conductivity region may have a shape that is about the same shape as the wire bond pad," and "the reduced conductivity region may have an area that is about the same as, slightly less than or slightly greater than, the area of the wire bond pad." '623 patent, 12:56 to 13:01. This indicates that the "edges" need not be "exactly aligned" as argued by SemiLEDs. SemiLEDs insists, however, that the patentee disclaimed anything other than exact alignment during patent prosecution:

> Yang does not disclose 'the edges of the reduced conductivity region [] aligned with the edges of the non-transparent feature,' as recited in amended Claim 1. The cited portion of Yang shows a p-type ohmic contact electrode [] that is wider than a current blocking structure.

(D.I. 118, p. 33). The applicant only explicitly distinguished claim 1, and only claim 1 was amended consistent with this disclaimer. Claim 23, which is the claim under construction, was neither distinguished nor amended. The patent examiner's Notice of Allowance, however, appears to have attributed the disclaimer to claim 23 as well as claim 1:

> The prior art of record, taken alone or in combination, fails to anticipate or render obvious a reduced conductivity region in the p-type semiconductor layer, wherein the edges of the reduced conductivity region are aligned with the edges of the non-transparent feature as recited in claims 1, 11, 23, 58 and 59.

Id. SemiLEDs argues that an explicit disavowal of subject matter made during prosecution in connection with one claim is also applicable to a second claim covering that same subject matter, even if the applicant did not explicitly disavow the subject matter as to the second claim, so long as the Notice of Allowance applied the disavowal to both claims. SemiLEDs cite *ACCO Brands v. Micro Sec. Devices, Inc.*, a case where the applicant explicitly disclaimed subject matter pertaining to two claims by distinguishing prior art in response to a rejection. 346 F.3d 1075, 1078-79 (Fed. Cir. 2003). The Notice of Allowance repeated and documented the applicant's disclaimer, as the applicant had made statements distinguishing the prior art as to both claims. *Id.* at 1079. The claims themselves, however, were not consistent with the disclaimer, as the applicant only amended one of the two claims. *Id.* The other retained the original language that included the previously rejected and then disclaimed subject matter. *Id.* The court noted that an applicant usually has no obligation to respond to a Notice of Allowance, and that the unilateral statement of an examiner will not limit a claim. When, however, the Notice of Allowance made clear that the examiner and applicant understood that the applicant had limited the claimed technology in both of the claims, the disclaimer applied to the non-amended claim. *See Id.*

As in *ACCO Brands*, the Notice of Allowance appears to limit the claims. Unlike in *ACCO Brands*, however, the applicant never disclaimed the subject matter from every claim at issue. The applicant's explicit surrender of the "Yang" prior art was only made as to claim 1, not claim 23. In *ACCO*

Brands, the disclaimer applied to both claims because the applicant made explicit statements throughout the prosecution history surrendering the prior art to both claims. In contrast, the examiner here imported limitations made in regard to claim 1 into claim 23 with no supporting statements made by the applicant. The examiner's remarks were thus unilateral in nature, and the unilateral remarks of an examiner cannot narrow a claim. *Salazar v. Procter & Gamble Co.*, 414 F.3d 1342, 1347 (Fed. Cir. 2005). For these reasons, the Court finds no disclaimer as to claim 23.

The question remains of how to describe the reduced conductivity region's position in relation to the wire bond pad. Cree offers "beneath," while SemiLEDs proposes "aligned with." The specification describes the reduced conductivity region as "beneath" and "directly beneath" the wire bond pad in some parts. 6:24-29; 8:60-9:03. The specification is also supportive of construing the wire-bond pad as "aligned" with the reduced conductivity region, at 2:14-16; 8:16-9:22, 17:17-19, 12:56-13:1, 13:25-27. The Court agrees with SemiLEDs that "aligned with" provides a more accurate location for the reduced conductivity region than the broader term of "beneath." The Court, however, also recognizes that the term "generally aligned with" better reflects the embodiments detailing a reduced conductivity region slightly smaller or slightly larger than the wire bond pad area, as well as to ensure differentiation from claim 1's language requiring the edges to be exactly aligned. For these reasons, the Court construes this term as "is generally aligned with the non-transparent feature."

iii. "In a Region other than a Reduced Conductivity Area of the Surface of the p-type Semiconductor Layer"

Cree's Proposed Construction:	Construed as part of larger phrase above according to its plain and ordinary meaning: In a region other than a reduced conductivity area of the surface of the p-type semiconductor layer.
SemiLEDs Proposed Construction:	In a region of the p-type semiconductor that is not the reduced conductivity portion of the p-type semiconductor feature and not under the non-transparent feature on the n-type semiconductor layer.

Construction of the Court:	In a region other than a reduced conductivity area of the surface of the p-type semiconductor layer.

Cree proposes that this term needs no further construction, while SemiLEDs offers "in a region of the p-type semiconductor that is not the reduced conductivity portion of the p-type semiconductor and not under the non-transparent feature on the n-type semiconductor layer." The primary dispute is whether the "reduced conductivity area" may only exist on the "surface" of the p-type semiconductor layer, or whether it also must extend "into" the p-type semiconductor layer. Cree reads SemiLEDs' proposal as an attempt to require the reduced conductivity area to extend into the p-type semiconductor layer. SemiLEDs argues that its construction is the most accurate, as even the thinnest reduced conductivity area must extend into the p-type semiconductor layer.

The plain language of claim 23 envisions a "region" that is "of the surface of the p-type semiconductor." One of the embodiments describes the p-type semiconductor's contact layer as "a patterned ohmic contact is formed on a surface of the p-type semiconductor layer opposite the n-type semiconductor layer. The [LED] also includes a non-ohmic contact on the p-type semiconductor layer opposite the wire bond pad." *Id.* at 13:67-14:03. The non-ohmic contact can form the "reduced conductivity area" in claim 23, as depicted in Figure 7A. Figure 7A clearly shows the "reduced conductivity region" as not extending into the p-type semiconductor. This can be contrasted with Figure 5, showing a reduced conductivity region extending into the p-type semiconductor layer. *Id.* at 12:42-47.[20] Figure 5 does not depict an embodiment described by claim 23, for it does not include the necessary ohmic and non-ohmic metal contact as required by claim 23. Figure 6A is also described as having a "reduced conductivity region" that may extend into the p-type semiconductor; it likewise lacks the ohmic and non-ohmic metal contact required by claim 23. *See Id.* at 13:25-28. The embodiments detailing "reduced conductivity regions" that extend into the p-type semiconductor layer cannot be squared with

[20] The specification states in relation to Figure 5 that the reduced conductivity region "may" extend into the p-type

the required elements of claim 23. These embodiments do not support the inference that claim 23 envisions a reduced conductivity region extending into the semiconductor layer.

In addition, the principle of claim differentiation undermines the argument that the reduced conductivity region extends into the semiconductor layer. Dependent claim 25 specifically adds the requirement that the reduced conductivity area be in the p-type semiconductor layer. Claim 25 would be duplicative of claim 23 if the latter claim is construed to require reduced conductivity areas extending into the p-type semiconductor. Further, SemiLEDs' contention made at oral argument that any "Schottky" contact necessarily extends into the semi-conductor layer is not supported within the specification or by any extrinsic evidence. SemiLEDs also argues that Cree's construction should be avoided to preserve the validity of the claim. "Claims can only be construed to preserve their validity where the proposed claim construction is practicable, is based on sound claim construction principles, and does not revise or ignore the explicit language of the claims." *Generation II Orthotics v. Med. Tech. Inc.*, 263 F.3d 1356, 1365 (Fed. Cir. 2001). As explained above, reading claim 23's reduced conductivity region as extending into the p-type semiconductor is at odds with the specification. It therefore cannot be construed differently, regardless of the construction's effect on validity.[21] For all these reasons, the Court rejects SemiLEDs' proposal and adopts Cree's construction of "in a region other than a reduced conductivity area of the surface of the p-type semiconductor layer."

D. Patent '380: Light Emitting Devices Having a Reflective Bond Pad and Methods of Fabricating Light Emitting Devices Having Reflective Bond Pads.

1. Technical Background

The '380 patent is focused on increasing light extraction from an LED. Like the '623 patent, the '380 patent is concerned with minimizing light absorption by the bond pad. The '623 patent discloses a reflective structure placed under the bond pad aimed at directing light back into the LED. The reflective

semiconductor layer. *Id.* at 12:42.

[21] SemiLEDs is not precluded from raising at the appropriate time that the claim as construed is anticipated. (D.I. 131, p.18 n.14).

structure is located between the bond pad and the contact metal, the latter of which is sufficiently thin so that light can pass through the contact metal to the reflective structure. This results in reduced absorption by the wire bond pad. Cree asserts claims 1, 3, 4, 5, 6, 8, 9 and 10 of the '380 patent.

2. "Photon Absorbing Wire Bond Pad"

Agreed Upon Construction:	A light absorbing contact structure to which a wire is subsequently bonded.

"Photon Absorbing Wire Bond Pad" is a term appearing in claims 1, 3, 4, 5, 6, 8, 9 and 10 of the '380 patent. The parties agree upon the construction of the term "photo absorbing wire bond pad" and the Court accepts the construction for the purposes of this litigation.

3. "Contact Metal"

Cree's Proposed Construction:	A metal that provides a contact so that current can pass from a metal material to a semiconductor material.
SemiLEDs Proposed Construction:	A metal contact layer that is distinct from the active region and provides an ohmic contact to the active region.
Construction of the Court:	A metal contact layer that provides an ohmic contact so that current can pass from a metal material to a semiconductor material.

The parties dispute the construction of "contact metal" as used in claims 1, 3, 4, 5, 6, 8, 9 and 10 of the '380 patent. Cree proposes "a metal that provides a contact so that current can pass from a metal material to a semiconductor material," while SemiLEDs offers "a metal contact layer that is distinct from the active region and provides an ohmic contact to the active region." The primary dispute is whether "contact metal" should be said to "provide an ohmic contact."

Cree proposes that "contact metal" here is a broad term that may refer to either an ohmic or non-ohmic contact. This position, however, is not entirely consistent with its proposed construction. Cree's construction details that the contact metal's purpose is to pass current between metal and semiconductor materials. Ohmic contacts facilitate the passage of current and non-ohmic contacts reduce or prevent the passage of current. If the purpose of the contact here is as Cree states, i.e. to pass current, it would make little sense for it to be non-ohmic. This would defeat its purpose to facilitate the passage of current. The specification at 6:35-37 describes a "contact metal" as one "that provides an ohmic contact to the p-type semiconductor material layer." *See also id.* at 4:35 and 6:59. The specification's use of "provides an ohmic contact" along with the intended function of the "contact metal" supports including "ohmic contact" within the construction.

SemiLEDs' construction that the "metal contact layer" is "distinct" from the active region is not required by the intrinsic evidence and is self-evident in the context of the '380 patent specification and claim language; if the "metal contact" were not a distinct material from the semiconductor, it would not be a separate component in need of construction. It also appears from oral argument and the briefing that the parties do not dispute that the "metal contact" is a "layer." The Court's construction follows: "a metal contact layer that provides an ohmic contact so that current can pass from a metal material to a semiconductor material."

4. "Reflective Structure"

Cree's Proposed Construction:	A structure that reflects light generated by the active region of the LED.
SemiLEDs Proposed Construction:	A reflective material that does not absorb light.
Construction of the Court:	A structure that reflects light generated by the active region of the LED away from the wire bond pad.

The parties dispute the construction of "reflective structure" as used in claims 1, 3, 4, 5, 6, 8, 9, and 10 of the '380 patent. Cree proposes "a structure that reflects light generated by the active region of the LED," while SemiLEDs offers "a reflective material that does not absorb light."

The specification describes the reflective structure with the following at 4:36-41: "By reflecting photons incident in the region of the wire bond pad, the amount of photons absorbed by the wire bond pad may be reduced." SemiLEDs' construction of "reflective structure" as a "reflective material that does not absorb light" is unduly narrow and taken literally would exclude preferred embodiments, as even the very reflective structures of silver and aluminum absorb *some* light.[22] The actual specification does not say absorption is eliminated; it says absorption is reduced. *See id.* 7:22-24. Cree's definition, however, omits the goal of the "reflective structure" to block as much absorption as possible.[23] This is accomplished by reflecting light away from the wire bond pad so it may escape the LED.[24] The court's construction of "reflective structure" is thus "a structure that reflects light generated by the active region of the LED away from the wire bond pad."

5. "Substantially Congruent"

Cree's Proposed Construction:	Having substantially the same size or shape.
SemiLEDs Proposed Construction:	The same size or shape.
Construction of the Court:	Having substantially the same size and shape.

[22] *See* Chu Deposition at 14:7-10 (D.I. 184, at 125) ; *see also* '380 patent, 7:19-21.
[23] Patent '380 at 1:62-2:03.
[24] Patent '380 at 4:36-41.

The parties dispute the construction of the term "substantially congruent" as used in claims 1, 3, 4, 5, 6, 8, 9, and 10 of patent '380. Cree proposes "having substantially the same size and shape," while SemiLEDs offers "the same size and shape." SemiLEDs argues both that "substantially" is inherently vague and that the applicant disclaimed "substantially" from the claim, while Cree proposes its construction as a common-sense interpretation.

Federal Circuit law is clear that "substantially" is not prohibitively indefinite: "the term 'substantially' is a meaningful modifier implying 'approximate,' rather than 'perfect.'" *Playtex Products, Inc. v. Procter & Gamble Co.*, 400 F.3d 901, 907 (Fed. Cir. 2005). The specification supports this definition at 7:10-14: "In some embodiments of the present invention, the reflective metal layer has a slightly larger area than the wire bond pad while in other embodiments of the present invention, the reflective metal layer has a slightly smaller area than the wire bond pad." SemiLEDs further argues, however, that the original '380 applicant disclaimed the "substantially" modifier from the patent. A disclaimer that narrows a claim term and excludes preferred embodiments must be "clear and unmistakable." *Playtex Products*, 500 F.3d at 907. The applicant did disclaim some prior art as follows:

> The performance of the capacitor of Hen would appear to be degraded if the reflective metal 6 was made congruent to the wire bond pad 7, as recited in claim 1...In conclusion, Applicants respectfully submit that even when the claims are given their broadest reasonable interpretation, 'congruent' must mean of 'same size and shape.'... Accordingly, even under the standard for examining claims during patent prosecution, the claims are patentable over Hen and/or Liu.

(D.I. 118, p. 29). This prosecution history shows a metal reflector "congruent" with the wire bond pad was key to distinguishing the prior art. The word congruent is given the definition sought by SemiLEDs: "having the same size and shape." The claim term at issue not "congruent" alone, however. It is "substantially congruent." The prosecution history does not mention or disclaim the word "substantially." It simply states that the performance of the prior "Hen" art would be degraded with a bond pad "congruent" with the reflective metal. It is not beyond the realm of possibility that a bond pad being "substantially congruent" would not be patentable over the "Hen" invention. The Court, however, is not willing to remove the modifier "substantially" from the claim language absent a "clear and unmistakable disclaimer," especially considering reading out "substantially" would be inconsistent with the description of some of the preferred embodiments. The Court adopts Cree's construction of "substantially congruent" as "having substantially the same size and shape."

III. Conclusion

The claim language shall be construed as set forth above.