UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before The Honorable Sidney Harris
Administrative Law Judge

In the Matter of CERTAIN HIGH-BRIGHTNESS LIGHT EMITTING DIODES AND PRODUCTS CONTAINING SAME	Inv. No. 337-TA-556

RESPONDENT EPISTAR CORPORATION'S RESPONSE TO COMPLAINANT'S PETITION FOR REVIEW OF THE INITIAL DETERMINATION

Counsel for Respondent

Arthur Wineburg
Colleen M. Coyle
Tobias E. Zimmerman
AKIN GUMP STRAUSS HAUER & FELD LLP
1333 New Hampshire Ave, N.W.
Washington, D.C. 20036
Telephone: 202.887.4000
Facsimile: 202.887.4288

Yitai Hu
Sean P. DeBruine
S.H. Michael Kim
AKIN GUMP STRAUSS HAUER & FELD LLP
Two Palo Alto Square
3000 El Camino Real, Suite 400
Palo Alto, CA 94306
Telephone: 650.838.2000
Facsimile: 650.838.2001

TABLE OF CONTENTS

TABLE OF ILLUSTRATIONS

Page(s)

TABLE OF AUTHORITIES

Page(s)

Federal Court Cases

TABLE OF AUTHORITIES

Page(s)

ITC Decisions

Statutes and Other Sources

Pursuant to Commission Rule 210.43(c) (19 C.F.R. § 210.43(c)), Respondent Epistar Corp. ("Epistar") respectfully submits this Response to Complainant Lumileds' Petition for Review ("LP") of the Initial Determination of Administrative Law Judge Harris ("ID"). As shown below, Lumileds has not carried its burden of demonstrating clear error on factual determinations or any legal errors at all. Accordingly, Lumileds' Petition should be denied.

I. INTRODUCTION AND SUMMARY

Lumileds' petition is rife with inconsistencies and misstatements of the record, which it apparently deemed necessary in order to find support for its arguments. While it is not possible to identify all instances of such things from a 171-page petition in the short period Epistar has to respond, Epistar identifies a few of the more egregious examples throughout this Response.

Lumileds also argues three themes – none of which are relevant to the Commission's decision here. First, Lumileds complains that "Epistar has taken these fundamental and critical concepts, without Lumileds' permission, and used them to achieve dramatically improved light output and market success." LP at 44-45. Noticeably absent from Lumileds' discussion is any reference to the claims or specifications of the patents, which disclose and define what Lumileds actually invented. Lumileds' complaint is really that it now has serious competition in the marketplace from a good product that is available from Epistar. LP at 13. Contrary to Lumileds' contention, however, the inventors of the '718 patent and the '580 and '316 patents do not credit themselves or others employed by Lumileds with development of the technology that has driven Epistar's success. Instead, long before litigation began, Lumileds credited Epistar's employees for the inventions which drive the success of Epistar's products. *See* RX-0177 at EC190079 (several years after the patents in suit issued, the inventors stated that using ITO and metal over AlGaInP was recently reported by Epistar employees and distinguished that invention from their own). *See* Epistar's Petition ("EP") at 19.

Second, Lumileds is disappointed that the ALJ did not blindly accept the testimony of Lumileds' expert Dr. Dupuis, even though he is a science medal winner who has met and had his picture taken with President Bush. LP at 9. *See also* CX-801 *and* 08/03/06 Hr'g Tr. (Dupuis) at 505:21-506:12 (describing picture). Throughout its Petition Lumileds complains that it provided evidence of a fact that was inconsistent with the evidence Epistar provided, and the ALJ accepted Epistar's evidence rather than Lumileds'. *See, e.g.*, LP at 60 (ALJ gave no weight to evidence), LP at 61 (ALJ discounted evidence). In other words, Lumileds challenges the credibility determinations of the ALJ. The ALJ sat through many days of hearings and listened attentively to everything the parties had to say. Acceptance of one set of facts over another is the ALJ's job as factfinder – it does not demonstrate clear error. That a party does not like the conclusions the ALJ reaches is not grounds for error when, as here, they are supported in the record.

Third, Lumileds touts its alleged success in the market, implying that one can be successful only by infringing Lumileds' patents. This conclusion is not supported by the testimony of Lumileds' witnesses, who clearly testified that success is a multifaceted issue of which the patents are only a small part. *See* 08/03/06 Hr'g Tr. (Silkwood) at 479:3-481:13 (identifying price, customer service, and on-time delivery as important factors to success). And, Lumileds' conclusion is contradicted by its own brief. For example, Lumileds contends that the high brightness LED market for the auto industry is $500 million per year, yet Lumileds' total gross revenue on these products since 1989 is or slightly more that per year for all industries – traffic lights, cell phones, back lighting, and automotive. LP at 10-11. Companies other than Lumileds must be selling LEDs to the auto industry that are just as good or better than Lumileds' LEDs since they have captured the greater share of that $500 million per year of that business. In other words, while Lumileds may have been the first to market an

AlGaInP LED, there now are many others – including Epistar – in this industry who do not infringe Lumileds' patents.

As set forth herein, Lumileds' excess verbiage, themes, misstatements of the record and the inconsistencies in its arguments are not relevant to the Commission's determination. Instead, Epistar focuses its attention in this Response on what Lumileds ignores – the patents and products actually at issue in this investigation. Focusing on the relevant issues alone, it is clear that Lumileds has not provided any basis on which the Commission should review the ALJ's conclusions of fact or law.

II. THE '718 PATENT

A. The ALJ Correctly Construed The Term "Substrate"

The ALJ's interpretation of the term "substrate" as "the supporting material in an LED upon which the other layers of an LED are grown or to which those layers are attached and which provides adequate mechanical support for the device," (ID at 34-35), must be upheld because it is supported by both the '718 patent and the record. Lumileds' arguments to the contrary should be rejected.

1. The ALJ Properly Rejected Lumileds' Dictionary Definition

Relying on the American Heritage Dictionary (and not a technical dictionary as it did in construing other terms in the patent), Lumileds argues that "the patent uses 'substrate' in accordance with its 'ordinary and customary meaning' to mean an 'underlying layer; substratum.'" LP at 33. Extrapolating from this, Lumileds argues that any layer that sits under any other layer, no matter how thin, is a substrate. LP at 33, 38-40. The Federal Circuit's decision in *Phillips v. AWH Corp.* teaches, however, that in construing the patent, it is the claims and the specification – not the dictionary – that are the place to look to determine the meaning of the term. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1321-22 (Fed. Cir. 2005). Indeed, the Court

criticized earlier decisions that looked first and principally to extrinsic evidence to define a term such as Lumileds advocates here:

> The main problem with elevating the dictionary to such prominence is that it focuses the inquiry on the abstract meaning of words rather than on the meaning of claim terms within the context of the patent. Properly viewed, the "ordinary meaning" of a claim term is its meaning to the ordinary artisan after reading the entire patent.

Id. at 1321. Accordingly, "ordinary" meaning is not the meaning that an English professor might give a word – it is the meaning that a skilled artisan would ascribe to the term after reading the entire patent.

If, after reading the entire patent, the Commission believes further definition were needed than what is provided in the patent, or if the Commission wished to confirm its understanding of the specification, it should look not to the dictionary of English professors, but to the dictionary one of skill in the art would look to, *i.e.*, a technical dictionary. *Phillips*, 415 F.3d 1319, 1322 (stating the court may look to technical dictionaries to confirm its understanding of the specification and expressing preference for technical rather than standard English dictionaries). Thus, the ALJ appropriately considered the definition of a substrate in the IEEE dictionary ("the supporting material upon which an integrated circuit is fabricated or to which an integrated circuit is attached"). *See* Order No. 27 at 11-13; ID at 34-35.[1]

2. Lumileds' Construction Contradicts The Claim Language

Lumileds' construction of substrate as <u>any</u> underlying layer contradicts the claim language. According to Lumileds, any layer or many layers can be the substrate. Indeed, Lumileds describes the substrate in Epistar's OMA products as any and all of

[1] Lumileds' criticism of this definition as relating to integrated circuits rather than LEDs (LP at 38 n.12) is not supported by any record citation or any evidence in the record. In any event, the dictionary definition is merely confirmatory of the claims and specification which set forth the limitations on the term.

layers because they underlie other layers (LP at 25). Lumileds identifies four separate layers in the GB product as substrates, including and sapphire. LP at 28-29. Claim 1, however, contemplates one substrate, not multiple substrates. Specifically, the language states "**a** semiconductor substrate;" not multiple semiconductor substrates, and "an electrical contact to **the** substrate;" rather than an electrical contact to one of the substrate**s**. The ALJ properly rejected Lumileds' construction because it is contrary to the express language of the claim.

Lumileds then argues that the substrate is not an important part of the invention and, therefore the Commission should give the term wide berth, in effect paying no mind to the specification or the claim limitation. LP at 34-35, 44-46. Of course, Lumileds has no authority to cite for the proposition that claim limitations can be ignored when they are not the essence of the invention. Indeed, none exists because the law is just the opposite. *See, e.g.*, *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29-30 (1997) (each element contained in a patent claim is deemed material to defining the scope of the patented invention). Accordingly, the Commission must look at each element of the claim, rather than the invention as a whole, and cannot overlook any one element merely because another might be more important. In any event, the substrate is not, as Lumileds claims just an insignificant part of the LED. LP at 35. As its own expert, Dr. Dupuis, explained, absent the thick portion of the LED that Epistar, the Staff, and the ALJ have identified as the substrate, the LED would fall apart. 08/08/06 Hr'g Tr. (Dupuis) at 1133:22-1134:2. And, as Lumileds itself concedes, the substrate is of key importance in growing active layers without excessive dislocations that would ruin the device. LP at 22.

3. The Specification Supports The ALJ's Construction

The specification speaks of the substrate only in terms of the thick support structure that underlies the device. For example, figures 1 and 2 of the '718 patent identify the thick bottom portion of the device as the "substrate" (10) and (20). In figure 1, it is (10) that is the substrate, not (11) or (12) even though those portions sit underneath others (13). Likewise, in figure 2, the inventors identify (20) as the substrate and not 21, 22, 23, or 24 even though those portions underlie other layers of the device. *See* '718 patent ("CX-2") at 1:17-32, 2:46-3:5. The patent further provides a method for growing a transparent semiconductor on the active layers which are grown on a temporary substrate, GaAs. *Id*. at 2:20-30. The temporary GaAs substrate is then etched away leaving "a layer of transparent semiconductor adjacent to the active layers which has sufficient thickness to provide the strength of a substrate." *Id*. In other words, a window layer is grown sufficiently thick to provide the strength of the original GaAs substrate.

Likewise, in describing figure 3 of the patent, (reproduced below at right), the specification explains that the substrate is the mechanical support for the device. In column 4, line 36 to column 5, line 10, the inventors explain that figure 3 represents a GaAs substrate (31) which is the thick layer supporting a confining layer (32), the active layer (33), an upper confining layer (34) (figure A) and the thick window layer of GaP (35) (figure B). "The GaP layer is also grown much thicker than the active layers to provide a desired mechanical strength for the completed device." CX-2 at 5:1-3. The temporary GaAs substrate (31) is then removed, "leaving only the active AlGaInP layers and the relatively thick GaP layer [35] which provides mechanical strength as a transparent "substrate." *Id.* at 5:6-9 (figure C). Then, a second GaP layer, a window layer, is added to the device (36) (figure D). Notably, the patent calls (35) a "substrate" in quotations, which recognizes that this GaP layer is different from a substrate as

that term is commonly understood. *See* 08/08/06 Hr'g Tr. (Dupuis) at 1138:1-23 (stating that these quotations indicate that the term substrate here is not being used in the common sense of the thick substrate on which the epi layers are grown). Thus, the GaP "substrate" in figure 3 is different from the substrate discussed in claim 1, but it nevertheless provides the mechanical strength of a substrate. Note that the GaAs substrate has no quotation marks because, before it is removed, it is the thick underlying structure which supported the device as the layers are grown. Thus, if the ALJ erred at all in his analysis, it was in considering figure 3's GaP "substrate" (35) a substrate as that term is used in claim 1. Nonetheless, the ALJ took this embodiment into account and defined substrate to include the GaP "substrate" when he found that the substrate of claim 1 can be attached to the other layers (as GaP is in figure 3) but it must still provide support. Order No. 27 at 13-14.[2] The top GaP layer in figure 3 (35) (in figure 3(C)) provides strength to the active layers because of its thickness – it is like the silicon in Epistar's OMA and MB products which, as Dr. Dupuis admits, holds the device together. 08/08/06 Hr'g Tr. (Dupuis) at 1133:22-1134:2; 08/03/06 Hr'g Tr. (Dupuis) at 545:1-10. Accordingly, it is Lumileds' contention that the ALJ defined substrate to exclude the preferred embodiment, and not the

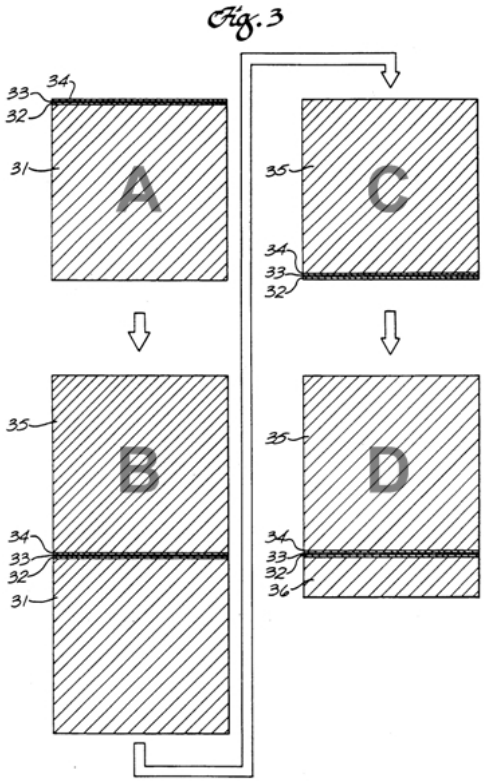


Illustration 1:
FIG. 3 From The '718 Patent

[2] The ALJ's error in considering the GaP "substrate" in figure 3 to be the same as that in claim 1 is most likely harmless error as none of Epistar's products would be effected by this analysis.

ALJ's definition, that is erroneous.[3]

Thus, the specification in words and drawings sets forth clear parameters for the substrate. The substrate may underlie the other layers, may be grown on or attached to other layers, but it must provide the important function of mechanical support and strength to the device. And, the ALJ correctly defined it as such. Order No. 27 at 11-13; ID at 34-35. Lumileds' English dictionary definition, which overlooks the fact that the substrate must provide strength and mechanical support, is therefore not consistent with the claims or the specification and should not be considered. *Phillips*, 415 F.3d at 1322-1323 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F. 3d 1576, 1584, n.6 (Fed. Cir. 1996)) (dictionaries may be used so long as they do not contradict the definitions ascertained by reading the patent documents).

4. The ALJ Gave Appropriate Consideration And Weight To The Extrinsic Evidence

The ALJ also considered the testimony of the expert and other witnesses and was in the unique position to evaluate their demeanor and credibility. While Lumileds' expert did in fact testify that he believed that one of skill in the art would read the specification and conclude that a substrate is any underlying material (LP at 38), Epistar's experts testified otherwise. *See, e.g.*, 08/08/06 Hr'g Tr. (Stringfellow) at 1578:19-1579:9; 08/10/06 Hr'g Tr. (Jokerst) at 1713:9-20, 1834:8-16. How one of skill in the art would interpret a phrase or word at the time the patentee applied for the patent is a question of fact which the ALJ correctly resolved by determining which of the conflicting pieces of testimony is more likely correct. *See, e.g., Certain Flooring Products*, U.S.I.T.C. Inv. No. 337-TA-443, Notice of Final Determination, 2002 WL 1040233, at *15 (March 22, 2002) (declining complainants' petition to review an ID in part because the ALJ

[3] Under Lumileds' construction, the GaP substrate in figure 3 (35) which sits above and not below the other layers would not be a substrate within the terms of the patent. Thus, under its own analysis, Lumileds would be defining the term to exclude the preferred embodiment.

had found their expert's testimony "flawed"). Although Lumileds does not agree with the ALJ's conclusions, they are supported by the record and should not be reviewed.

Lumileds also points to less than a handful of statements where the experts do not precisely define the thicknesses that would qualify as a substrate. LP at 39-40. Whether a substrate is sufficiently thick to provide support for the device is obviously a question dependent on the circumstances, including how many layers the substrate is intended to support. Accordingly, it is no shock that the answer to the question of how thick a substrate should be may vary. But, contrary to Lumileds' contention, that does not leave any uncertainty in the patent claims as the patent itself sets exemplary parameters for the substrates' thickness (*see, e.g.*, CX-2 at 5:3-5 (recommending thickness ranges between 150 and 200 micrometers ("microns" or "μm"[4]))), and the patent also clearly specifies that it must be thick enough to provide mechanical support or strength. *Id.* at 5:5-10, 2:26-30.

Moving further from the specification and into completely irrelevant territory, Lumileds next argues that another of its patents (the '580) and a paper cited in that patent (Noguchi) use the term substrate to mean a thin layer. LP at 38-39. While the specification of these other patents is clearly not relevant to the meaning of the term in the '718 patent, Lumileds nevertheless cites them as evidence, and so Epistar will address them. With respect to the '580 patent, once again Lumileds misrepresents the record. The '580 patent does teach that certain semiconductor materials allow for better bonds, so that adding that material to the top of a thick substrate will result in better bonding. '580 patent ("CX-3") at 3:53-55. The substrate is then the combination of the thick growth substrate and the additional epitaxial layer. However, the '580 patent never refers to a thin layer alone as a "substrate." In fact it states the opposite. In the

[4] One micron (1 μm) = 10,000 angstroms (Å), so the recommended substrate thickness in the '718 patent is between 1.5 and 2 million Å.

portion of that patent cited by Lumileds, the patent says that a thin epitaxial layer, specifically called a "wafer bond layer," may be grown on a commercial substrate. *Id.* at 10:33-35. That thin layer – still supported by the substrate – may then be wafer bonded to an LED structure. After the bonding, the growth substrate may be removed. *Id.* at 10:35-37. Nowhere in this passage is the thin (2 μm) layer referred to as a substrate; rather at all times it is referred to as a "wafer bond layer" distinct from the supporting substrate. But as the ALJ concluded, the layers Dr. Dupuis identified as the substrate in Epistar's products did not provide the mechanical support for the device. 08/08/06 Hr'g Tr. (Dupuis) at 1126:20-1128-12. Accordingly, even if, as Lumileds contends, "engineered" or "composite" substrates are not uncommon, (LP at 49), the references upon which Lumileds relies require some modifier to explain the substrate, thereby demonstrating that they are in fact not the plain traditional unmodified substrate familiar to the skilled artisan and identified in the '718 patent.

Further misrepresenting the record, Lumileds argues that Epistar's expert conceded in the context of the '718 patent that a 10 micron thick layer is a substrate. LP at 48. The testimony cited demonstrates that he was not being questioned about the '718 patent. Instead, he was discussing a different patent to Noguchi, which Dr. Stringfellow explained combined two layers, calling them a substrate, and that the combined layers were greater that 200 microns thick – and were thus able to provide the necessary mechanical support. 08/09/06 Hr'g Tr. (Stringfellow) at 1577:6-1579:9.

Yet another egregious misrepresentation of the record is Lumileds' argument that a paper by Dr. Jokerst and others of her colleagues that deal with "compliant substrates" proves that a substrate is a thin material. LP at 40 n.15. As Dr. Jokerst explained and indeed the referenced papers themselves make clear, a "compliant substrate" is a thin flexible layer placed over a

traditional substrate in order to fill gaps and imperfections caused by lattice mismatches in the substrate so that additional layers can be grown on a smooth surface. CX-234 at 2308; CX-563 at 1754; 08/10/06 Hr'g Tr. (Jokerst) at 1713:21-1714:24; *id.* at 1901:2-17 (stating that she used the modifier "compliant" because, if she called such a thin layer simply a "substrate" people would misunderstand what she meant). Accordingly, the ALJ gave these papers and testimony their due weight.

5. The ALJ's Construction Is Consistent And Correct

Finally, Lumileds complains – inaccurately – that the ALJ proposed many inconsistent constructions of the word "substrate." LP at 32. This argument is misleading and incorrect.[5] Contrary to Lumileds' contention, the rulings are entirely consistent. In Order No. 27, the ALJ held that the specification required the substrate to provide strength to the device and rejected Lumileds' contention to the contrary. Order No. 27 at 12 & n.46. He also reasoned that because the patent (at 4:36-5:9, discussing figure 3) provided a GaP window layer (35) was not the material upon which other materials are fabricated, grown or attached, he could not accept the definition proposed by Epistar because it would exclude the preferred embodiment. Order No. 27 at 13. Thus, the ALJ concluded that the patent must encompass supporting material upon which other layers are grown or, like figure 3, the material to which other layers are attached. (The active layers being attached to the GaP window (35) in figure 3). *Id*. at 14. The ALJ thus

[5] As an initial matter Lumileds pushed hard for a prehearing *Markman* ruling, which required the parties to submit *Markman* briefs in the midst of expert discovery and trial preparation. *See* Order No. 16 (granting Lumileds' Motion for a *Markman* hearing). The ALJ attempted to accommodate Lumileds' request and issued a *Markman* ruling (Order No. 27) prior to the hearing. Despite the fact that Lumileds argued that an early *Markman* hearing was necessary to narrow the issues at trial, Lumileds nevertheless spent many hours of testimony rearguing the definition of "substrate" the ALJ had earlier rejected. Accordingly, rather than use the early *Markman* ruling to narrow issues as Lumileds represented, Lumileds used it as a practice test for its theories.

never abandoned the conclusion he reached that the substrate was the supporting material in the device.

At the hearing, as it does here, Lumileds took liberties with this definition and argued that as long as some modicum of support no matter how small is provided, it is a substrate. LP at 47-50. Thus, according to Lumileds, if you put a piece of paper on a cement floor and stand on it, the paper and not the floor is providing support. But, if you add books on top of the paper and stand on top of the books, it is still the paper that is providing the support, thus defying any logic. *See* 08/04/06 Hr'g Tr. (Dupuis) at 562:6-563:16. In reality, Lumileds' argument boils down to the "substrate" being whatever layer(s) Lumileds chooses to best fits its legal arguments.

It is because Lumileds attempts to distort the meaning of the construction of the claim term provided in Order No. 27 that the ALJ clarified in the Initial Determination that the support he required in Order No. 27 meant real support – that not just any amount of support, real or imagined, would suffice. The support provided by the substrate must, as the patent states, provide the mechanical support for the device, *i.e.*, it must be adequate to keep it from falling apart. Thus, there is no inconsistency in the ALJ's rulings, only a rejection of Lumileds' attempt to bastardize the support requirement in Order No. 27.

Lumileds attempts to confuse the Commission with the arguments on p. 35-36 of its Petition. On the one hand, Lumileds claims the ALJ said that "substrate" can be grown on top of other layers, and on the other the ALJ repudiated that position in the Initial Determination when he found that layer in Epistar's products is not the substrate as construed in Order No. 27 because it sits on top of other layers. LP at 27-28. In context, however, it is clear that the ALJ's determination that layer in Epistar's GB II product is not the substrate, notwithstanding Dr. Dupuis' claim to the contrary, is based upon the fact that that layer is not

"the supporting material" upon which other layers are grown or attached. As stated by the ALJ, "to determine whether layer is the supporting material in an LED upon which other layers are grown or attached, it is necessary to examine the process by which the GB product is fabricated." ID at 56 (emphasis supplied). After quoting testimony as to how the product is fabricated, the ALJ concluded that the layer was not the substrate as he had construed it in Order No. 27. Rather, the ALJ found that, as RX-181C shows, "the active layers, layer are attached to the sapphire layer . The remaining layers of the LED structure are fabricated on top of the device which uses sapphire as a foundation." ID at 57-58 (emphasis added). Thus, consistent with Order No. 27, the ALJ found that the foundation or support for the device was the sapphire, making it the "supporting material" referenced in Order No. 27 and the mechanical support as explained in the Initial Determination.

Likewise, Lumileds' quote (LP at 36) of a portion of the Initial Determination is misleading in that it skips the essence of the ALJ's conclusion and his discussion of Lumileds' expert's testimony. "Here Dr. Dupuis indicates that the function of the layers is not really to provide support, but rather to insure an electrical connection through the device." *Id*. at 68. Thus, while the ALJ did indeed acknowledge that, as in figure 3, the substrate could be grown on top of another layer (*i.e.*, it did not have to be the very bottom layer of the device) he consistently and correctly insisted that the substrate must provide the mechanical support for the device and this is the element he found lacking in what Lumileds defined as the "substrate" in Epistar's products. Even Lumileds' expert had to admit that without the portions of the devices the ALJ found to be substrates in Epistar's products, *i.e.*, the large silicon block in the OMA and MB products, and the large sapphire block in the GB products, the devices would fall apart. 08/08/06 Hr'g Tr. (Dupuis) at 1133:22-1134:2; 08/03/06 Hr'g Tr.

(Dupuis) at 545: 1-10. Accordingly, there is nothing inconsistent about the ALJ's various discussions of the definition of substrate.

6. Lumileds Has Not Demonstrated That Review Of The ALJ's Conclusion That GB And OMA Do Not Infringe Is Warranted

Lumileds has not provided sufficient basis for the Commission to review either the ALJ's findings of fact or conclusions of law and the ALJ's construction of the term "substrate" should not be reviewed, and if reviewed, it should be adopted. As such, it is clear that Epistar's OMA products do not, as the ALJ found, have an "electrical connection to the substrate" (*i.e.*, the silicon), but rather that connection is made elsewhere in the device. It is equally clear that the GB product has an insulating rather than a "semiconducting" substrate (*i.e.*, the sapphire), and for that additional reason GB products cannot infringe claims 1 or 6 of the '718 patent.

B. The ALJ Properly Rejected Lumileds' Doctrine Of Equivalents Arguments For The Claim Terms "Semiconductor Substrate" And "Electrical Contact To The Substrate" Of The '718 Patent

The ALJ's determination that the OMA, OMA II, GB, and GB II products do not meet the "semiconductor substrate" and "electrical contact to the substrate" limitations under the doctrine of equivalents is without error and need not be reviewed. As an initial matter, the Commission should not consider the merits of Lumileds' argument that Epistar's products infringe the "electrical contact to the substrate" limitation under the doctrine of equivalents because the ALJ excluded that evidence. *See infra* Part IV.B. Accordingly, if the Commission concludes that the ALJ's evidentiary ruling is correct, it need not consider the merits of Lumileds' claim. Even so, Lumileds provides no basis to reverse the ALJ's conclusion that there is no infringement of the "semiconductor substrate" or "electrical contact to the substrate" limitations of the '718 patent.

1. Epistar's Products Do Not Infringe The "Semiconductor Substrate" Limitation Under The Doctrine Of Equivalents

With respect to the "semiconductor substrate" element, Lumileds does not dispute that the silicon in the OMA and the MB products is the substrate. 08/08/06 Hr'g Tr. (Dupuis) at 1139:12-15. The ALJ correctly concluded that the function of the "semiconductor substrate" is to serve as the foundation for an LED device, and that function "is achieved by providing adequate mechanical support for a device such that it does not break apart." ID at 60. Given this function, there can be no question that the ALJ correctly concluded that the layers in the OMA and GB products do not perform the same function as a "semiconductor substrate," and thus are not equivalents. ID at 60-61. Dr. Dupuis agrees that the layers simply do not provide adequate mechanical support for the LED device. 08/08/06 Hr'g Tr. (Dupuis) at 1133:22-1134:2 (without the silicon substrate the devices would fall apart). The record does not support the conclusion that the layers are capable of performing the same function as the claimed "semiconductor substrate."

In its Petition, Lumileds argues that the layers are equivalent to a "semiconductor substrate" merely because Epistar's expert Dr. Stringfellow does not provide a rebuttal opinion at the hearing. As explained above, Dr. Stringfellow had no notice of this argument. In any event there was no need to rebut the argument because it was not disputed that the layers Dr. Dupuis identified as the "substrate" do not provide sufficient mechanical support for the device to keep it from falling apart. The burden is on Lumileds to demonstrate that the functions are equivalent, it is not Epistar's burden to disprove Lumileds' theories.

Lumileds' argument that the combination of the layers with the sapphire or silicon substrates found in the GB and OMA products would be equivalent to the claimed "semiconductor substrate" element is without any merit. Contrary to Lumileds' contention, the

ALJ did not misunderstand its argument. The ALJ repeated Lumileds' "combination of elements" argument and rejected it. LP at 52. *See also* ID at 59-60. Because it is black letter case law that the doctrine of equivalents cannot be used to read out a limitation in a claim, *Warner-Jenkinson*, 520 U.S. at 29-30, Lumileds' argument must be rejected. And, while it is true that the cases Lumileds' cites do state that two or more elements in the accused product may be combined in a doctrine of equivalents argument, those cases also hold that proposition is not applicable where, as here, the combination of elements would essentially write a limitation out of the claim. *See e.g.*, *Ethicon Endo-Surgery, Inc. v. U.S. Surgical Corp.*, 149 F.3d 1309, 1317-19 (Fed. Cir. 1998) (recognizing that where, as here, the claim ties the element to a particular place in the device, the court may not find an equivalent if the element is found elsewhere). Here, the claim requires an electrical contact to the substrate. Accordingly, an electrical contact not to the substrate cannot be the equivalent because it would write out the requirement that the contact be to a specific place. Here, the patent calls for a semiconductor substrate – not sitting on top of a substrate, which is how it must be construed if Lumileds' combination theory is adopted.

In its Petition, Lumileds suggests that the doctrine of equivalents can be applied to an invention as a whole by stating that the doctrine "seeks to protect the 'essence'" of a patent. LP at 30. There can be no worse misconception of the doctrine of equivalents. The law is clear that "equivalence [is] assessed on a limitation-by-limitation basis, as opposed to from the perspective of the invention as a whole." *Freedman Seating Co. v. American Seating Co.*, 420 F.3d 1350, 1358 (Fed. Cir. 2005); *see also Warner-Jenkinson*, 520 U.S. at 29 ("Each element contained in a patent claim is deemed material to defining the scope of the patented invention, and thus the doctrine of equivalents must be applied to individual elements of the claim, not to the invention

as a whole."). Lumileds' reliance on *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.* to support its position is also erroneous. The Supreme Court in *Festo* dealt mainly with the question of prosecution history estoppel and did not discuss the application of the equivalents doctrine in detail. Indeed, the quote on which Lumileds relies is a general statement about why the doctrine exists, not instruction on how it should be applied. *See Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.,* 535 U.S. 722, 731 (2002). *Festo* recognizes that the Supreme Court's decision in Warner-Jenkinson was the state of the law on the applicability of the doctrine of equivalents. *Festo,* 535 U.S. at 733. In fact, even in *Festo*, the Supreme Court recognized that the doctrine of equivalents should be applied to individual claim elements. *Id.* at 732 ("It is true that the doctrine of equivalents renders the scope of patents less certain. It may be difficult to determine what is, or is not, an equivalent to a particular element of an invention.") (emphasis added). The Commission should not be misled by Lumileds' attempt to rewrite the law on the doctrine of equivalents to fit its needs.

2. Epistar's Products Do Not Have An Equivalent To The "electrical contact to the substrate" Limitation

Because Epistar did not have adequate notice of Lumileds doctrine of equivalents argument, (*see infra* Part IV.B), Dr. Stringfellow, who testified about the '718 patent did not provide an opinion on whether the topside electrical contacts which do not connect to the substrate in Epistar's OMA and GB are equivalent to the "electrical contact to the substrate" limitation in claim 1. Had he known of Lumileds' argument in advance, Dr. Stringfellow would have addressed it. However, there is no rule, and thus Lumileds cites none, that testimony about the doctrine of equivalents has to come from an expert, much less from any particular expert. The ALJ is at liberty to apply facts elicited at the hearing to any claim where it makes sense to do so. In other words, the ALJ's analysis is not circumscribed by a particular expert's testimony.

There was evidence in the record sufficient to support the ALJ's conclusion that the OMA and GB products do not have an equivalent to "an electrical connection to the substrate" limitation. Review is not warranted.

As discussed in Parts III.D.1 & III.D.3 below, the OMA I & OMA II and GB I & GB II products all have both electrical contacts on the topside of the devices. The silicon or sapphire substrate in these products, which provide support for the device, is on the very bottom of the device and thus, none of the products have "an electrical contact to the substrate." Lumileds' equivalents argument requires the Commission to disregard the structural limitations in the claims. Once again, the doctrine of equivalents cannot be used in such a manner. *Warner-Jenkinson*, 520 U.S. at 29-30 (the doctrine of equivalents cannot be used to read a claim limitation out of the claim); *see also Cooper Cameron Corp. v. Kvaerner Oilfield Prods., Inc.*, 291 F.3d 1317, 1322 (Fed. Cir. 2002) (a port above two plugs in an accused device is not an equivalent to the claimed port "between the two plugs;" this condition would vitiate the "between the two plugs" requirement of the claim).

In any event, as the ALJ recognized, the evidence shows that having contacts to the topside of an LED is substantially different from having contacts to the substrate. ID at 69. In discussing the structure and design of Epistar's products, Dr. Jokerst explained that different layers, materials, and structures are necessary for an LED to conduct current in a device with two topside contacts than an LED with one top and one bottom contact. Specifically, in Epistar's OMA and GB products, current can only travel part of the way down the LED, then it must travel horizontally across the LED device above the layers, and then travel up the p-side bond pad – forming a "U" shape flow. 08/10/06 Hr'g Tr. (Jokerst) at 1686:3-21. In an LED device with a top and bottom contacts, current need only flow down through the device.

08/10/06 Hr'g Tr. (Jokerst) at 1686:3-21. Dr. Jokerst explained that this "results in a very different device," because the current in the OMA and GB products is being forced through a much smaller area - about 1,000 times smaller. 08/10/06 Hr'g Tr. (Jokerst) at 1686:22-25. Thus, the amount of current throughput for the device will be very different and the light emitting performance of the device will also be very different. 08/10/06 Hr'g Tr. (Jokerst) at 1688:7-11. Accordingly, the ALJ's conclusion that the OMA and GB products do not have an equivalent to the "electrical contract to the substrate" limitation in claim 1 of the '718 patent is supported by the evidence in the record, and if reviewed, the Commission should adopt this conclusion.

III. THE FINDING OF NO INFRINGEMENT OF THE '580 AND '316 PATENT IS MANDATED BY THE FACTS AND THE LAW AND SHOULD BE ADOPTED

A. The ALJ's Claim Construction Of "Wafer Bonding" Is Fully Supported By The Record

In construing "wafer bonding", the ALJ carefully considered all of the evidence presented by the parties and, in 14 pages of the ID, explained his construction of wafer bonding –

> the term "wafer bonding" means the bringing of two wafer surfaces into physical contact such that a mechanically robust bond forms between them. The type of wafers that may be wafer bonded is not strictly limited to semiconductors, but may also include glass or a mirror. Furthermore, Van der Waals bonding, metal-to-metal bonding and glue bonding are not wafer bonding within the meaning of the '580 and '316 patents.

ID at 19-20.[6] The ALJ painstakingly dealt with each of the arguments Lumileds makes in support of its construction. Lumileds does not show in its Petition that the ALJ had no bases for his findings and resulting construction of "wafer bonding," only that Lumileds still disagrees with those instances where the ALJ rejected its arguments.

[6] Lumileds characterizes the construction of the claim term wafer bonding as "the single most important issue" in its Petition, and yet inexplicably spends 73 pages on less important issues before reaching it. LP at 74.

As the ALJ held, one skilled in the art at the time of the '580 patent filing,[7] March 1993, would have understood the term "wafer bonding" to refer to the direct bonding of two wafer surfaces without any intervening adhesives or metals. ID at 14. The ALJ did not pull this definition out of the thin air, as Lumileds argues. Instead, he was presented with the testimony of several experts, only one of which could profess expertise in semi-conductor bonding – and unremarkably the ALJ credited her testimony. In addition, the ALJ carefully reviewed the intrinsic evidence – the claim, the patent specification and the prosecution history. When this is contrasted to the fact that in order to find "support" for its argument, Lumileds had to resort to a carefully selected and misleading recitation of the record, it is clear that the ALJ's construction should not be reviewed.

1. The ALJ Construed "Wafer Bonding" As It Was Understood At The Time Of The Patents' Filings

It is true that the ALJ credited much of the testimony of Epistar's expert, Dr. Jokerst whom he accepted as an expert in the field of bonding optoelectronic devices such as LEDs. ID at 164-165. Dr. Jokerst was active in the field of wafer bonding from before the time of the alleged invention claimed in the '580 and '316 patents through the present day. *See* 08/10/06 Hr'g Tr. (Jokerst) at 1644:1-10; *id.* at 1645:21-1646:4. Dr. Jokerst's patent was cited by the patent office in rejecting Lumileds' claims during the prosecution of the '316 patent. CX-36 at LL ITC 0000405-406. Lumileds provided no evidence that Dr. Dupuis had ever bonded or directly supervised the bonding of two wafers together. *E.g.*, 08/10/06 Hr'g Tr. (Dupuis) at 2046:8-19 (admitting he has never attempted any metal bonding).

[7] The '316 patent is a divisional of the '580 patent and shares the same disclosure.

Dr. Jokerst testified that the term "wafer bonding" had a generally understood meaning in the art at the time of the alleged invention. In particular, those familiar with the technology at the time referred to wafer bonding as bringing two smooth, clean and flat solid surfaces into direct contact so that a bond is formed between them, and then applying high heat and pressure to form a stronger bond. 08/10/06 Hr'g Tr. (Jokerst) at 1654:7-1655:9. Dr. Jokerst's testimony is more than her personal opinion; it is amply supported by the contemporaneous literature. In March 1992, one year before the filing of the '580 and 316 patents, Dr. Bengtsson in a seminal review article summarized the state of the art in wafer bonding, citing more than 200 published papers before 1993. RX-105 at LL ITC 00089840.[8] In the Introduction, Bengtsson states "[t]his review deals with the bonding of silicon wafers, oxidized or not, without the use of electrostatic fields or additional adherence materials deposited on the surfaces." *Id.* at LL ITC 00089840. In the next section, entitled "The Wafer Bonding Mechanism," defines wafer bonding as bringing "two clean and exceptionally flat and smooth surfaces . . . into contact [and] . . . annealed at an elevated temperature to increase the fracture strength of the bonded interface. Temperatures of 700°C and above are normally used. . . . " *Id.* at LL ITC 00089840-1.[9]

Dr. Jokerst explained how the term "wafer bonding" experienced "creep" to encompass other forms of bonding in later years as researchers followed the money:

> So as the field progressed, people began to get more and more excited abut this wafer bonding, and about the mid-'90s, say, '95, government money began pouring in from governments all over the world into this area. And so what we began to see is an

[8] Accordingly, Lumileds' contention that Epistar did not cite any contemporaneous publications that support its construction of wafer bonding is false. *See* LP 60, 74-5, 81. There are more than 200 such articles referenced in the record. *See infra* pp. 22-23.

[9] Lumileds quotes from Bengtsson's introduction in which he describes "a very large number of materials may be used as adhesive layers." LP at 89. This quote is taken out of context. This quote is in the second paragraph of the paper, in the "Introduction" section, and is describing other prior means of bonding silicon wafers before he proceeds in the rest of the paper to focus on wafer bonding. RX-105 at LL ITC 00089840.

> expansion of the term "wafer bonding," kind of like nanotechnology, if there's a lot of money in a work, suddenly, that work includes a lot more people doing that work because they have access to the money, and so we've got term creep in our term "wafer bonding," essentially.

08/10/06 Hr'g Tr. (Jokerst) at 1676:19-1677:5. *See also* 08/10/06 Hr'g Tr. (Jokerst) at 1675:2-1678:18. Dr. Garrou confirmed Dr. Jokerst's testimony (08/10/06 Hr'g Tr. (Garrou) at 1636:7-25) and their testimony is corroborated by the contemporary documentary record.

Of the 200 plus articles and conference papers using the term "wafer bonding" published between 1985 and 1992 referenced by Bengtsson (RX-105), Lumileds managed to find only two references prior to the filing of the '580 patent in March 1993 which Lumileds contends do not support the construction of "wafer bonding" adopted by the ALJ. LP at 75.[10] Lumileds misinterprets or misreads these documents; they do not support Lumileds' position.

The first, published in 1987, is entirely consistent with the construction adopted by the ALJ. In particular, that article discussed bonding of two wafers, each of which has a solid layer of SiO_2 on the face being bonded. RX-0174. In applying the SiO_2 layers, the wafers are first coated with spin-on-glass. The wafers are then heated to burn off the organic material, which leaves pure SiO_2 layer behind. After the solid SiO_2 layers are formed, the then solid, flat, smooth wafer surfaces of SiO_2 are brought into contact and heated to form a wafer bond. *Id.* at EC002194.

The second reference, published in 1989, does refer to a number of methods of bonding wafers under the heading "wafer bonding." However, only one of those methods is expressly referred to as "wafer bonding," namely the "silicon-wafer direct bonding" method of Shimbo,

[10] Lumileds also relies on these documents to argue that Dr. Dupuis refuted Dr. Jokerst's testimony regarding expansion of the "wafer bonding" term, LP at 88, but as shown, these two documents do not contradict Dr. Jokerst at all.

which consists of "contacting . . . silicon or silicon-oxide surfaces which are flat and of a high surface finish, and an anneal step above 900°C. . . ." RX-134 at EC000663. Lumileds refers to these two papers as "a number of patents and publications from before the filing of the 580 and 316 patents characterizing glue and metal bonding as examples of wafer bonding." LP at 60. That is such a gross exaggeration that it is a misrepresentation of the record.

In addition to the two publications discussed (and dismissed) above, Lumileds identified one patent (CX-662) as pre-dating the '580 patent that it contends supports its expansive inclusion of glue and metal-to-metal bonding in the definition of wafer bonding. LP at 60. But that patent does not support Lumileds' position; it was filed on December 21, 1993, eight months after the filing of the '580 patent application. Lumileds compounds its misrepresentation in the next sentence: "In contrast, the ALJ, Staff and Epistar have not identified a single document to the contrary." LP at 75. *See also* LP at 60, 81, 88. Lumileds must have forgotten Bengtsson and the approximately 200 articles published before 1992 he cites that refer to "wafer bonding" as direct bonding without use of intermediaries such as glue, just as the ALJ construed the term. Lumileds' overblown rhetoric does not conform to the record.[11]

In sum, the vast weight of the documentary evidence available contemporary with the filing of the patents demonstrates that those skilled in the art at the time of the alleged invention understood "wafer bonding" to refer, as the ALJ construed, to be bringing two wafer surfaces together without any intervening adhesives or metals such that a mechanically robust bond forms between them. ID at 19-20.

[11] Giving Lumileds the benefit of the doubt, one could read its statement "In contrast . . . to the contrary" to mean that Epistar did not produce any articles saying that glue bonding and metal-to-metal bonding "are not wafer bonding." However, there is no reason to believe there would be such articles at the time the patent was filed because as Bengtsson demonstrates, the definition of wafer bonding was basically universally understood as the ALJ construed it.

The evidence Lumileds offers is from 1997 and later, and it argues these late publications support its contention that "wafer bonding" was not limited to direct bonding in early 1993.[12] As this evidence comes five or more years after the filing of the patent, it corroborates, not refutes, Dr. Jokerst's testimony that there was a change in the definition of wafer bonding after the filing of the '580 and '316 patents. The only relevant test for the construction of a claim term is its meaning to one of skill in the art at the time of the invention. The meaning of a claim term must be ascertained in the proper "technological and temporal context," *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1360 (Fed. Cir. 2004), *cert. dismissed*, 126 S. Ct. 2921 (2006) (emphasis added), none of this evidence is relevant. That is especially true when dealing with a term, like "wafer bonding," the ordinary meaning of which has changed over time. *Plant Genetic Sys., N.V. v. DeKalb Genetics Corp.*, 315 F.3d 1335, 1345 (Fed. Cir. 2003). Thus, Lumileds' evidence is irrelevant, and the ALJ properly declined to credit it.

> the Administrative Law judge does not give weight to Lumileds' argument that those of ordinary skill in the art understand the term "wafer bonding" to encompass glue bonding because Lumileds has cited to contemporary Epistar documents and references to make its point rather than documents from the time of the filing of the '580 patent application in 1993.

ID at 16.

Lumileds complains that the ALJ'S statement is "wrong," again referencing "a number of patents and publications from before the filing of the '580 and '316 patents characterizing glue and metal bonding as examples of wafer bonding." LP at 60 (emphasis in original). As just shown above, regardless of how many times Lumileds repeats this refrain, it is neither true nor supported by the record evidence. *See also* LP at 74-75, 81. Remaining unconcerned about

[12] To support Lumileds' expansive definition, Lumileds' expert Dr. Dupuis relies upon the 1997 book chapter written by Dr. Fletcher and Dr. Kish, other publications beginning after 1997, as well as the testimony of Epistar engineers about processes used by UEC after 2001. LP at 76-80.

accurately describing the record, Lumileds gamely concludes: "In short, both before and after the patents, those skilled in the art consistently construed 'wafer bonding' to include glue and metal bonding." LP at 76 (emphasis supplied). The ALJ's rejection of such arguments as lacking credible support in view of Bengtsson and the 200 contemporaneous articles as well as Dr. Jokerst's testimony demonstrating the exact opposite of what Lumileds claims is clearly not in error.

2. The Only Wafer Bonding Disclosed And Claimed In The Patents Is Direct Wafer Bonding Without Intermediate Layers

The intrinsic evidence here is consistent and clear. The specification of the '580 and '316 patents uses the term "wafer bonding" exclusively in its generally accepted sense of direct bonding two solid wafer surfaces together without any intermediate adhesive layers.

> The Administrative Law Judge does not find that the '580 patent and '316 patents provide guidance as to other ways [than direct bonding with use of high heat and pressure] to perform wafer bonding. Drs. Jokerst and Dupuis agree." ID at 14.

The patents detailed descriptions of "wafer bonding" involve the direct contact between two semiconductor wafer surfaces that have been cleaned, the temperature being raised to *e.g.*, 850-1000°C and a compressive force being applied. *See, e.g.*, CX-3 at 12:34-65. All other disclosed embodiments are consistent with the direct bonding of two solid layers. *See* ID at 13-19. The specification never mentions metal-metal or adhesive bonding. Nowhere in the patents is there any mention of bonding using intermediate adhesive layers of glue or metal.

- The specification does not discuss the use of any type of adhesive layer to "glue bond" wafers together. ID at 14.
- Nor does the ALJ find that the specification supports the conclusion that metal to metal bonding should be encompassed by the term "wafer bonding." ID at 16.
- [M]etal to metal bonding requires more than just the use of metal in an LED structure. ID at 17.

- Dr. Dupuis acknowledges that the patents' specification makes no mention of either glue or metal-metal bonding. ID at 9.

Nonetheless, Lumileds argues here, as it did unsuccessfully before the ALJ, that figure 10 uses oxide or glass layers as intermediate adhesive layers. Such an argument misrepresents the patent, and properly was not credited by the ALJ.[13] ID at 14-15. The patent describes "layer 52," as either an oxide such as SiO_2 or glass.[14] CX-3 at 9:11. Layer 52 is a "transparent layer" within the meaning of claim 1. The patent discloses that the surface of layer 52 and the surface of an LED layer are directly contacted and then heated to form a bond:

> The surface of layer 52 is then brought into contact with the surface of the buffer layer 32, and treatment forms a wafer bond between the layers. Annealing will enhance the bonding strength between the materials.

Id. at 9:23-26. There is no discussion of the use of any adhesive. Nor is there any disclosure of bonding with intermediate layers; it is direct bonding.

Furthermore, the patent teaches that because the glass or oxide layer 52 is insulating, it has to be patterned to provide exposed areas for metal contacts 56 and 58 to conduct the current from the p electrode contact to the p-n juncture active layers. Since this embodiment is "as in the embodiment described immediately above" (*id*. at 9:15-16),

> [t]he anneal achieves a <u>wafer</u> <u>bond</u> in the non-metallized areas and provides a <u>bond</u> at the metallized contacts.

Id. at 9:1-2 (emphasis added). This distinction is made in the patents (where an intermediate metal is coated onto the surfaces, and then the metals are bonded) between the bonding of the

[13] "[T]he glass layer 52 in figure 10 appears to be functioning as a 'transparent layer" within the meaning of claim 1 rather than as a glue." ID at 15. The ALJ further found that while "'spin-on-glass' could be used as an adhesive in the fabrication of LEDs . . . the use of 'spin-on-glass' is not disclosed in the specification of the '580 patent." ID at 15.

[14] This passage is inconsistent with Lumileds' attempt to equate SiO2 with glass. Clearly the inventors considered them to be distinct, as Dr. Garrou testified and the ALJ found. ID at 14-15.

metallized contacts which the patent calls "a bond" from the direct bond of insulating glass layer 52 with the LED structure 40, which it refers to as "a wafer bond." (emphasis supplied). Lumileds argues that the distinction is made because the bond of the metal contacts, being over a small portion of the entire surface of the bonded interface, is not by itself "robust," and the bond between the glass layer 52 and the LED structure is robust. LP at 27. But there can be no bonding of the metallized contacts without the wafer bonding of the glass layer with the LED structure because there is no way to heat only the metallized contacts without also heating (and wafer bonding) the remaining surface of glass layer and LED structure. Therefore, to argue that "a bond at the metallized contacts" is not robust and "a wafer bond in the non-metallized areas" is robust makes no sense. One cannot be bonded without the other. This argument is too clever by half, and exposes the weakness of Lumileds' position.

Likewise, the ALJ explained that when the specification refers to the bonding of a mirror to an LED structure, it does not require the mirror be of metal, just of an "electrically conductive material." ID at 17; CX-3 at 9:27-28. The ALJ found, as Dr. Jokerst described in her testimony, that metal to metal bonding is more than just the use of metal in an LED structure and the "patent specification gives no indication . . . [nor] provides instructions as to how to perform metal bonding" in connection with the bonding of a mirror to an LED structure. ID at 17-18.

Lumileds insists that "the inventors . . . were not concerned with whether wafer bonding is 'direct,' 'indirect,' or performed with glue or metal." LP at 75. Nothing in the record supports that grand statement, and, thus, Lumileds does not cite to any support. Moreover, the evidence demonstrates otherwise, as the inventors only experimented with "direct" bonding (*see* RX-54; RX-320; Kish Depo (04/26/06) at 94:21-95:7; 08/03/06 Hr'g Tr. (Kish) at 421:11-422:12; *id.* at 387:1-405:9; 08/03/06 Hr'g Tr. (Robbins) at 295:21-23)), and never mentioned any other type of

bonding in their patents. 08/08/06 Hr'g Tr. (Dupuis) at 1095:11-16; 08/08/06 Hr'g Tr. (Dupuis) at 2052:16-24; 08/10/06 Hr'g Tr. (Jokerst) at 1661:6-21. Lumileds continues: "the patents are unconcerned with the type of wafer bonding performed . . . ." *Id.* Not surprisingly, Lumileds does not explain how it reached that conclusion and again cites to nothing to support it.

Lumileds' reliance on the prosecution history also is misplaced, for at least two reasons. First, in the prosecution history of the '580 patent – the only patent that has claims of "wafer bonding" – there is no reference to wafer bonding as including the use of adhesives or metal. 08/08/06 Hr'g Tr. (Dupuis) at 1095:11-16; 08/08/06 Hr'g Tr. (Dupuis) at 2052:16-24; 08/10/06 Hr'g Tr. (Jokerst) at 1661:6-11. Lumileds misrepresents that the "ALJ acknowledges that . . . the prosecution of the '580 Patent . . . refers to the metal-to-metal annealing taught in Jokerst as wafer bonding." LP at 86-7 (emphasis supplied). However, the reference to Jokerst is in the prosecution history of the '316 patent (not the '580 patent) which was prosecuted after the '580 patent issued. ID at 18-19. Second, as the ALJ found, the reference during the prosecution of the '316 patent is conflicting: there are references 'to the metal-to-metal annealing taught in Jokerst as wafer bonding' but Lumileds also states to the PTO during the prosecution that Jokerst "teaches nothing about the fabrication of an LED with a wafer bond and suggests only two ways to bond semiconductor surfaces . . . metal-to-metal bonding." ID at 18-19. Lumileds' attempt to distinguish this last reference to Jokerst from the others "because the Jokerst reference is taking LEDs that were already fabricated and using metal-to-metal wafer bonding to attach them to an integrated array" does not explain why the other references "Jokerst as wafer bonding" when Jokerst "teaches nothing about . . . a wafer bond. . . ." LP at 87. In any event, a few passing references in a later prosecution, after the '580 patent issued (and while the "creep" was occurring) has to be weighed as part of the entire record, and in that weighing is smothered by

the far greater weight of evidence that "wafer bonding" in 1993 has the meaning ascribed to it by the ALJ.

In conclusion, the ALJ's construction of the claim term "wafer bonding" is correct. Neither his review of the documentary evidence nor his crediting of the testimony of Dr. Jokerst is in error.

B. "Coupled To," "Joined To" And Wafer Bonded "To The LED Layers" Were Properly Construed To Mean Directly To The LED Layers

Claim 8 of the '580 patent includes the limitation that a replacement substrate be "coupled to" the LED layers by the wafer bonding step, CX-3 at 17:27-29; claim 16 requires the step of wafer bonding an electrically conductive mirror "to one of the first or second sides" of the LED layers, *id.* at 18:22-25, and claim 1 requires the wafer bonding of a transparent layer "to the LED layers." *Id.* at 16:48-49. Claim 12 of the '316 patent requires that the "wafer bond layer" be "coupled to" the semiconductor light-emitting layers. '316 patent ("CX-4"), at 16:47-48. The ALJ properly construed these limitations to require a direct contact between the specified layers, Order No. 27 at 60-63 and 83, and found these claims are not infringed as construed. ID at 81, 96, 104 and 129. The evidence fully supports the ALJ's determination that the plain meaning of these limitations is "directly to" and that no other meaning was contemplated by the patents. Thus, as Dr. Jokerst opined, there is no other reasonable way to construe these terms, and the ALJ rightly agreed that "directly to" is the plain and ordinary meaning. *See* Order No. 27 at 57-58, 60.

The ALJ's construction is mandated by the claim limitations alone. For example, the layers to be "coupled" together in claim 16 of the'316 patent (dependent on claim 12) are the wafer bond layer and the LED layers for generating light. CX-4 at 16: 47-50. The claim further requires an "interface" of the wafer bond layer and the semiconductor layers. *Id.* As discussed

below, the term "interface" is understood by those skilled in the art as meaning a shared physical boundary. *See infra* Part III.C.4.a. For the wafer bond layer to form an interface that exhibits the required characteristics, it must be directly coupled to the light emitting semiconductor layer because the "interface" here is construed that exhibits edge dislocations in the wafer-bond layer, and such dislocations can only occur when two lattice-mismatched semiconductor crystals are pressed together at a high pressure and temperature.[15]

The specification itself is fully consistent. The term "coupled" is used twice in the specification. First, an electrode should be "coupled" to the substrate to allow the LED device to be forward biased. RX-3 at 9:35, CX-4 at 9:15. There is no discussion or illustration of that coupling, although other embodiments all show the electrodes directly joined to the substrate. *See, e.g.*, CX-3 at figures 7 and 12. Second, the two graphite members in the wafer bonding apparatus of figure 18 are "coupled" after the wafers are inserted. *Id*. at 12:46. In both of these instances "coupled" refers to a direct physical contact at a shared boundary. Lumileds misreads figure 18 to argue that the two halves of the graphite bonding apparatus in Fig. 18 of the patents are not directly coupled. LP at 64. *See id*. at 33-65. The bonding apparatus of Fig. 18 includes two flat graphite members (84, 86) with a recessed pocket to hold the pair of wafers (80) to be bonded. After the wafers are loaded into the cavity, the two graphite members (and the two wafers) are coupled by inserting the pins (90) into holes (88) . CX-3 at 12:45-46. Once aligned, the large flat surfaces, are obviously in direct contact. Thus, the two halves are directly coupled to one another. This use of the word "coupled" merely reinforces the ALJ's finding that in every instance in the patent, the phrases "coupled to" or "bonded to" refer to a direct connection without intervening elements.

[15] 08/10/06 Hr'g Tr. (Garrou) at 1604:15-1605:7

Lumileds also argues that because claim 13 of the '316 patent requires the wafer bond layer to be "directly adjacent" to one of the light emitting layers, claim differentiation requires a different construction – namely that "coupling" includes intermediate layers. LP at 62-63. The ALJ rightly rejected that argument. Order No. 27 at 83. Claim differentiation is not a hard and fast rule; it is merely a presumption is rebutted if the claims will bear only one interpretation, even when that interpretation makes the claims identical in scope. "The doctrine of claim differentiation can not broaden claims beyond their correct scope, determined in light of the specification and the prosecution history and ay relevant extrinsic evidence." *Multiform Desiccants, Inc. v. Medzam, Inc.*, 133 F.3d 1473, 1480 (Fed. Cir. 1998). *See also Autogiro Co. of Am. v. United States*, 384 F.2d 391, 404 (Ct. Cl. 1967).

As the ALJ recognized, the plain and ordinary meaning of these terms, as confirmed by their usage in the patent, means "directly" joined. ID at 81 (citing Order No. 27 at 60). Furthermore, the terms "wafer bonding" "interface" and "wafer bond layer" all rule out layers "coupled" by intervening materials. *See supra* Part III.A.2. Thus "coupled to" can only mean directly coupled.

Moreover, as explained by the ALJ, claim differentiation does not apply for another reason. By its own terms, Claim 13 merely excludes the embodiments in Figs. 6 and 10, which are included in claim 12, where there are some small areas of metal intervening between the wafer bond layer and the semiconductor light emitting layer thereby distinguishing claim 13 from claim 12. ID at 130-131. As such, "coupled to" must be construed to have its ordinary meaning of directly coupled and nothing in claim 13 alters that construction.

Finally, Lumileds raises an argument not presented in any of its three briefs to the ALJ on this issue: a collection of cases discussing patents in a different field of art construe a so-called

"similar limitation" differently. LP at 63-64. Those cases are irrelevant, because there is no showing that the use of the terms in those patents would have any bearing on the understanding of these term in these patents by those skilled in the LED field. In fact, Lumileds points to a completely different claim term entirely in one such case. LP at 63 ("connected to"). Lumileds presents no arguments to support its conclusion that the use of these terms in different patents, addressed to very different technologies, should have any bearing on the construction of these terms in this patent, addressed to this technology.

Lumileds has therefore presented no valid reason to depart from the ALJ's construction of these terms.

C. Epistar's Indirect Bonding Methods Are Substantially Different From The Claimed "Wafer Bonding"

Lumileds' infringement arguments concede that Epistar's OMA I & OMA II, GB I & GB II, and MB I & MB II LED's, do not bring two wafers together in direct contact, as required by "wafer bonding" in the '580 patent. Accordingly, Epistar's products cannot literally infringe the '580 patent. Moreover, Lumileds' arguments that Epistar's products still infringe under the doctrine of equivalents contradicts settled Federal Circuit law, ignores undisputed evidence, and relies on irrelevant facts.

Indeed, after hearing all of the evidence at trial, the Staff retracted its original position that it would find infringement under the doctrine of equivalents, and found overwhelming evidence that showed Epistar's indirect glue and metal bonding processes are substantially different from the wafer bonding required by the '580 patent. Commission Investigative Staff's Post-Hearing Brief, at 21 ("In light of the hearing testimony and the Judge's claim construction order (Order No. 27), the Staff no longer holds that view [that glue bonding and metal bonding are equivalents to wafer bonding].").

1. Epistar's OMA I & OMA II and GB I & GB II That Use a Glue Adhesive Cannot Infringe Under The Doctrine of Equivalents

All of Lumileds arguments that GB I & GB II and OMA I & OMA II infringe claims 1-3, 16-18, and 25, 27, and 28 of the '580 patent under the doctrine of equivalents must be rejected as a matter of law. LP at 98-102, 106-08, 122-24, 129-30. In the ID, regarding the term "wafer bonding," the ALJ found that:

> . . . the '580 patent specification and claims make clear that "wafer bonding" refers to direct fusion bonding. Indirect bonding, as performed for the accused products, cannot be found to meet this element of the claims because it would effectively ignore the proper construction of "wafer bonding . . . to the LED layers" and would "erase" limitations in claim 1 of the '580 patent.

ID at 86 (relying on *Asyst Techs., Inc. v. Empak, Inc.*, 402 F.3d 1188, 1195 (Fed. Cir. 2005) ("unmounted" structure not equivalent where claim required it to be "mounted")). Here, Lumileds essentially makes the same argument that was rejected in *Searfoss v. Pioneer Consol. Corp.*, 374 F.3d 1142, 1151 (Fed. Cir. 2004). In *Searfoss*, the Federal Circuit refused to find an indirect connection between components in an accused device an equivalent to a claim element that required a direct connection between two components. *Id.* at 1142.

Both the glue and metal bonding process for Epistar's products require adhesion ("intermediate") layers, so those methods are incapable of bringing two wafers together in direct contact which is necessary for "wafer bonding." ID at 19. For the OMA I & OMA II and GB I & GB II, a glue is used to indirectly bond layers above and below it. 08/10/06 Hr'g Tr. (Garrou) at 1602:12-223, 1603:24-1604:4. Thus, Epistar's OMA I & OMA II and GB I & GB II products cannot infringe the '580 patent because they do not bring two wafers in direct contact to each other.

Contrary to Lumileds' belief, Lumileds reliance on articles and evidence dated many years after the filing of the '580 patent that describe the term wafer bonding loosely to encompass glue bonding is irrelevant for purposes of the doctrine of equivalents. Although it is true that equivalents determination is made at the time infringement, for purposes of the '580 patent, that analysis still requires determining what techniques are interchangeable with the process of "bringing two wafer surfaces into physical contact such that a mechanically robust bond forms between them," as mandated by the meaning for wafer bonding. *See Warner-Jenkinson*, 500 U.S. at 37. In other words, proper equivalence analysis demands looking at techniques that will bring two wafer surfaces directly together at the time of infringement. Because at the time of infringement wafer bonding may include glue bonding does not make glue bonding equivalent to direct bonding. Those articles published after filing of the '580 patent cannot alter the meaning or scope given to "wafer bonding;" otherwise, the public has no way of knowing what meaning a claim term will be given in view of literature that may be published after filing, which may or may not have any bearing on a claim term.

Finally, the ALJ agreed with Epistar that "introducing foreign materials for bonding, such as adhesives or metals, the bonding process is different, and just as significantly, the resulting device is different from wafer bonding." ID at 86-87. Lumileds' attack on the ALJ's analysis is flawed for a number of reasons. First, Lumileds ignores the fact that all of the embodiments in the '580 patent show an LED with top and bottom electrical contacts for current to flow vertically, whereas the current path in OMA I & OMA II and GB I & GB II is in a "U" shape that causes less light to be generated. 08/10/06 Hr'g Tr. (Jokerst) at 1685:16-1688:10. Specifically, the U" shape is created by , and this path also

limits the amount of current and therefore limits the amount of light emitted. 08/10/06 Hr'g Tr. (Garrou) at 1611:14-17; 08/10/06 Hr'g Tr. (Jokerst) at 1694:16-1695:12; RDX-900.

That path is approximately 1000 times smaller than the path disclosed in the '580 patent, and as a result,

. 08/10/06 Hr'g Tr. (Jokerst) at 1685:16-1688:10, 1694:10-1695:16; RDX-900. Dr. Jokerst contrasted the difference by analogy to using a mail slot or opening the barn door to take delivery of a million letters. The conduction path necessitated by glue bonding was also likened to the applying of a tourniquet. Additionally,

. 08/10/06 Hr'g Tr. (Garrou) at 1604:14-23.

Second, Lumileds ignores the different bonding temperatures used in making OMA I & OMA II and GB I & GB II. In that process,

. *Id*. at 1682:3-8, 1683:17-1684:8, 1685:8-12. The

in contrast to 800°C to 1000°C for wafer bonding in the '580 patent. At higher temperatures such as °C to °C the glue will burn. 08/08/06 Hr'g Tr. (Hsieh) at 1288:3-15. As a result, unlike wafer bonded products, the OMA I & OMA II and GB I & GB II products cannot withstand temperatures above °C used for further fabrication and operations. 08/10/06 Hr'g Tr. (Jokerst) at 1620:20-15. The most effective LED contact annealing temperatures, however, are °C. *Id*. at 1663:12-1664:9; RDX-706 to RDX-708; RDX-802. Thus, by using a low annealing temperature, glue bonding results in a higher contact

resistance.[16] *Id*. at 1660:20-1661:5. Importantly, by introducing , which are insulating materials, the LED cannot be electrically conductive from top to bottom. 08/10/06 Hr'g Tr. (Jokerst) at 1660:14-22. Even according to the '580 patent, "[s]uch non-ohmic characteristics are generally intolerable for applications in which current is to be passed from one wafer-bonded substrate to another wafer-bonded substrate." CX-3 ('580 patent), at 13:58-61 (emphasis added). Clearly, these differences described above between the function, way, and result of glue bonding and wafer bonding show that OMA I & OMA II and GB I & GB II differ from the claimed invention in more than just minor or insubstantial differences.

Lumileds not only ignores the meaning for "wafer bonding," it reads out limitations in claims 1, 8, and 16 – *i.e.*, "to the LED layers" and "to one of the first and second sides of the LED layers" as well. The ALJ refused to do this because it is improper to do so. *See, e.g.*, ID at 86. "An element of an accused product or process is not, as a matter of law, equivalent to a limitation of the claimed invention if such a finding would entirely vitiate the limitation." *Freedman Seating*, 420 F.3d at 1358. The ALJ attributed the ordinary meaning for "to the LED layers" which means joined directly to the LED layers (Order No. 27 at 60), and the same applies to "to one of the first and second sides of the LED layers." Therefore, these claims require a transparent layer to be directly joined to the LED layers by wafer bonding (claim 1), or require a permanent substrate or mirror to be directly joined to one of the sides of the LED layers by wafer bonding (claims 8 and 16). In OMA I & OMA II and GB I & GB II, nothing is wafer bonded to any of the LED layers in Epistar's products.

For instance, in OMA I & OMA II or GB I & GB II, the closest layer to the bond to be even considered a LED layer is the layer – all other layers that

[16] Since does not achieve a "robust" wafer bond as defined by Lumileds, and therefore does not infringe under Lumileds' claim construction.

and would not be considered an LED layer. *See* RDX-500 to RDX-505. That layer has absolutely nothing bonded to it. Instead,

and that is not an LED layer. 08/10/06 Hr'g Tr. (Jokerst) at 1697:2-6. Even if is considered an LED layer, which it is not, there is still absolutely nothing bonded to it either. These limitations "to the LED layers" or "to one of the first and second sides of the LED layers" are not literally present in Epistar's OMA I & OMA II and GB I & GB II products, nor can they be under the doctrine of equivalents without completely removing them from claims 1, 8, and 16.

2. Epistar's MB I & MB II That Use a Metal Adhesive Cannot Infringe Under The Doctrine of Equivalents

Like OMA I & OMA II and GB I & GB II, all of Lumileds arguments that MB I & MB II infringe claims 8, 19, 16, and 18 under the doctrine of equivalents of the '580 patent must be rejected as a matter of law. LP at 138-141. As noted above in Part III.C.2, the ALJ found that indirect bonding is not an equivalent to the direct bonding required in the '580 patent. ID at 86. In making MB I & MB II, adhesion layer is required. Thus, without ignoring the wafer bonding limitation, Epistar's MB I & MB II products also cannot infringe the '580.

Lumileds continually ignores the evidence that bonding with a metal adhesive is different from direct wafer bonding. Indeed, the ALJ agreed that "[t]he evidence makes clear that bonding with the use of metal is different than direct wafer bonding." ID at 100. Metal bonding is a different way of bonding, requiring application of at least three metals on each structure: one for adhesion, one for diffusion barrier, and one for bonding. 08/10/06 Hr'g Tr. (Jokerst) at 1662:1-17. There is also a different result: the metal layers are not optically transparent, and so light cannot be outputted, in contrast to the '580 patent that discloses embodiments of wafer

bonding a permanent substrate to the LED layers such that light can be outputted from the sides of the substrate. *Id*. at 1663:12-1664:9. Furthermore, metal interfaces often degrade under typical operation conditions (temperature cycling, humidity) resulting in degradation such as "purple plague," and there the device cannot withstand such operating conditions. *Id*. at 1663:12-1664:9. Clearly, these differences described above between the function, way, and result of metal adhesive and wafer bonding show that MB I & MB II differ from the claimed invention in more than just minor or insubstantial ways.

Lumileds also cannot "erase" the direct bonding limitations including "to one of the first and second sides of the LED layers" recited in claims 8 and 9 that requires a permanent substrate or an electrically conductive mirror be directly joined to one of the sides of the LED layers. In MB I & MB II, the closest LED layer to the metal bonding adhesion layer is layer in MB I and layer in MB II. The Si substrate for MB I & MB II, however, is not bonded to it, nor is mirror. *See* RDX-504 & RDX-505. In MB II, even if layer were considered an LED layer, which it is not, there are still layers between it and the Si substrate. *See* RDX-505. This limitation "to one of the first and second sides of the LED layers" recited in claims 8 and 16 is not present in Epistar's MB I & MB II products, literally or under the doctrine of equivalents.

3. None Of The OMA I, OMA II, GB I Or GB II Include The "Wafer Bond Layer" Required By The '316 Patent Claims

Lumileds asserts that the OMA I & OMA II and GB I & GB II products infringe claims 12, 13, 14 and 16 of the '316 patent. Claims 13, 14 and 16 depend from claim 12. CX-4 at 16:53-65. As such, they must include every limitation in claim 12. One of those limitations – a "wafer bond layer" – is not present in any of these products. *Id.* at 16:47.

The patent provides an express definition of "wafer bond layer" as "a layer or substrate that exhibits the properties that are characteristic of a layer that has undergone wafer bonding." CX-4 at 4:18-23. And "one such characteristic is a different nature of misfit dislocations" in such "wafer bond layer" from those in an epitaxially grown mismatched heterointerface (*e.g.*, the interface between the growth substrate and the active layers). *Id.* at 4:23-26. The patent continues, in defining "a wafer bond layer"

> An interface that has undergone wafer bonding has been observed to exhibit misfit dislocations which primarily consist of "edge dislocations," *i.e.* dislocations whose Burgers vector lies in the plane of the wafer bonded interface. These properties are in contrast to an epitaxially grown mismatched interface, which typically exhibits a much higher density of "threading dislocations," *i.e.* dislocations which are not confined to the plane of the mismatched interface and tend to propagate perpendicular to the interface.

Id. at 4:18-35 (emphasis added). In other words, the patent expressly teaches that one of the characteristics of a wafer bond layer is the presence of "edge dislocations" which are "a different nature of dislocations" from "threading dislocations." *Id.* at 4:18-26.

The ALJ construed the term "wafer bond layer" as having , in addition to a robust bond, at least one other property characteristic of wafer bonding, such as a conductive ohmic interface or a different nature of misfit dislocations from those at the interface between epitaxially grown layers. Order No. 27 at 83.

Lumileds contends that the ALJ narrowed this construction to require edge dislocations in all instances. LP at 69. Not at all. In determining whether "wafer bond layer" limitation is found in the accused products, the ALJ immediately discarded "conductive ohmic interface." LP at 72-73. Indeed, Lumileds never argued that the wafer bond layer in the accused products included an conductive ohmic interface. The glue bonding method used by Epistar results in an electrically insulated interface that permits no current flow. 08/10/06 Hr'g Tr. (Jokerst) at

1660:14-20. Thus, Lumileds argues that having no misfit dislocations in the purported wafer bond layers is "having misfit dislocations that are of a different nature than an epitaxially grown mismatched interface." Order No. 27 at 83 (emphasis added).[17] Focusing on that argument, the ALJ rightly explained that the plain language of the patent, as reflected in his claim construction, requires some misfit dislocations, and that those misfit dislocation must be of "a different nature" than the "epitaxially grown mismatched interface" threading dislocations. The required different nature of misfit dislocations in the two layers cannot be satisfied when one layer has no dislocations whatsoever. ID at 125.

Recognizing defeat, Lumileds now asks the Commission to adopt a claim construction never before presented in this matter. LP at 71. Lumileds now contends that the required characteristics should be defined as having "a lower density of threading dislocations (*e.g.*, no threading dislocation)." LP at 71. Just like its argument that a different nature of dislocations means none, it now wants a "lower density of threading dislocations" to be a "different nature of dislocations." As set forth above, the patent defines the interface as having edge dislocations – primarily edge dislocations and fewer treating dislocations. Lumileds presents no valid reason for replacing this definition, based on the presence of dislocations, with one that focus on the absence of dislocations.

Indeed, the patent never contemplates the absence of dislocations, merely that there are edge dislocations in a wafer bond layer and fewer threading dislocations in a wafer bond layer than in an epitaxial layer. CX-4 at 4:19-35. For that reason Lumileds' entire discussion in its Petition of the disadvantages of threading dislocations is irrelevant. It is true that threading

[17] There is no dispute that the layers Lumileds alleges to be "wafer bond layers" have no crystalline structure and are therefore incapable of exhibiting any dislocations whatsoever. *See* 08/10/06 Hr'g Tr. (Jokerst) at 1663:3-7 (metal bonding) *and* 08/10/06 Hr'g Tr. (Jokerst) at 1742:6-12 (bonding).

dislocations that reach the active layer are not good. However, the patent teaches one of the advantages of wafer bonding is fewer threading dislocation because in wafer bonding edge dislocations predominant. *Id.* The patent never mentions wafer bonding as a way of avoiding dislocations altogether. Because new Lumileds' argument, like its old ones, is inconsistent with the express definition given in the patent, it is not a proper construction. Epistar's products do not meet the "wafer bond layer" limitation. As such, the findings of non-infringement of '316 patent should be adopted.

4. The Accused Products Lack The "Interface" Required In Claims 8, 9, 25, 27 And 28 Of The '580 Patent And Claims 12-16 Of The '316 Patent

In addition to the lack of the "wafer bonding" limitation, the Epistar products lack other elements required by claims 8, 9, 25, 27 and 28 of the '580 patent. In particular, none of the accused products include the type of "interface" required in claims 8, 9, 25, 27 and 28 of the '580 patent or the claims of the '316 patent.

a. "Interface" Is Correctly Construed

Lumileds' also invites reversible error by advocating a construction of the term "interface" that is unsupported by any relevant evidence. In place of the commonly understood meaning of the term, as used consistently in the patent, Lumileds offers a construction supported only by its expert's bare testimony. It is beyond dispute that expert testimony may not be relied upon to alter the meaning of a claim term. *Phillips*, 415 F.3d at 1318-1319; *Dow Chem. Co. v. United States*, 226 F.3d 1334 (Fed. Cir. 2000) (reversible error to premise claim construction on expert testimony inconsistent with the specification). Lumileds' proposed construction does not comport with the plain meaning of this term or the meaning as used in the patent. The relevant definition of "interface" in the IEEE dictionary is "a shared boundary." May 24, 2006 Declaration of Nan Jokerst, Ph.D. in Support of Epistar's Claim Construction Brief ("Jokerst

Decl."), Ex. 20. Dr. Dupuis's definition of interface adds the concept of an "interconnection" that is not present in any dictionary reference cited. Dr. Dupuis admits that he could not cite to any dictionary or written references to support his opinion that an "interface" as used in the '580 and '316 patents may include multiple intermediate layers or interconnections. 08/07/06 Hr'g Tr. (Dupuis) at 2047:19-2048:25. In fact, he admitted that his definition of "interface" is only "derived from" and therefore alters the standard IEEE dictionary definition. 08/07/06 Hr'g Tr. (Dupuis) at 853:7-15. Dr. Dupuis's unsupported testimony is exactly the type of litigation-motivated testimony that is not helpful in the claim construction process. *Phillips,* 415 F.3d at 1318 ("Extrinsic evidence consisting of expert reports and testimony is generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in intrinsic evidence."). The ALJ's decision to adopt Epistar and the OUII Staff's argument that the ordinary and customary meaning of this term to those skilled in the art, which is consistent with the term's usage in the patent is that an "interface" is the shared boundary or junction where two materials meet was correct and should not be reviewed.

In addition Claim 8 requires that force be applied to the LED layers and permanent substrate to "compress them together." CX-3 at 17:32-35. As the patent specification makes clear, this means pressing the surfaces of the two layers together (forming the interface) to overcome any unevenness of those surfaces. CX-3 at 5:33-37; *see also id.* at 12:62-64 ("the wafer surfaces tend to conform to each other when compressed"). This limitation would be meaningless if the "interface" included the essentially unlimited "intermediate layers" – metal or adhesives – that Lumileds would include in its construction. Clearly such "interconnections" would prevent the two wafer surfaces from being pressed together or "conforming" to one another.

Similarly, claim 12 of the '316 patent requires that the "interface" of the wafer bond layer and the semiconductor light emitting layers exhibit properties characteristic of layers that have been wafer bonded. The only such characteristic expressly defined in the patent are "edge dislocations." CX-4 at 4:18-34. Those dislocations form only when two semiconductor layers are forced directly together under high pressure and temperature. *See* 08/10/06 Hr'g Tr. (Jokerst) at 1654:15-1657:27.

The patent uses the term "junction" to describe a particular type of interface, explaining that a tunnel junction may be formed at the interface of two different LED layers when those layers are bonded directly together. In figure 12 of the '580 patent, a tunnel junction is formed at the interface of two LED materials. 08/10/06 Hr'g Tr. (Jokerst) at 1856:1-3; 16-19. Thus, a junction may form at an interface depending upon the materials that meet at that interface. A "junction" is understood to be "a region of transition between semiconductor materials of different electrical properties or between a metal and a semiconductor"). Jokerst Decl., Ex. 20, *supra*, at 359. That is exactly how the term is used in the patent. Where heavily doped semiconductor materials are joined directly together by wafer bonding, without any intervening layers, a "tunnel junction" is formed at the place those layers meet. CX-3 at 9:54-60. This is consistent with the ALJ's claim construction. Defining "interface" to include "interconnection" such that an unlimited number of materials and interfaces can intervene has no support in the patent, nor is it consistent with the understanding of one of skill in the art.

The ALJ properly rejected Lumileds' attempt to redefine the commonly understood term, especially since its proposed definition, as applied in arguing infringement, would render the "interface" limitation essentially meaningless. The term "interface" was properly construed

consistent with its ordinary meaning and consistent with its use in the patent: the "shared boundary" or junction where two different materials meet.

b. There Can Be No Equivalent Because The Accused Products Are Lacking The Required "Interface"

Lumileds concedes that these claims are not literally infringed under the correct construction adopted by the ALJ. Rather, Lumileds attempt only to show infringement under the doctrine of equivalents. LP at 120 *et seq.* ("even if the ALJ's claim constructions are accepted as true, the GB I & GB II LEDs infringe" under the doctrine of equivalents.) That argument has no merit.

Lumileds' attempts to ignore "interface" from claims 8, 9, 25, 27, and 28 must be rejected as a matter of law. Claim terms cannot be ignored in a doctrine of equivalents analysis. *Asyst Techs.*, 402 F.3d at 1188. Indeed, the ALJ found that "Lumileds is attempting to read out limitations of the claim through the doctrine of equivalents." ID at 118. For MB I & MB II, it has one silicon Si substrate, and it is not bonded to any of the LED layers, as required by claim 8. The Si substrate arguably has an interface with a metal layer , but certainly the metal layer is not an LED layer. Therefore, there is no interface with a substrate and LED layer in MB I & MB II.

For GB I & GB II, the ALJ rejected Lumileds argument that "bonding of the , and sapphire layers would be equivalent to 'wafer bonding the first surface of the first layer to the second layer' of claim 23." ID at 117. Lumileds' argument also ignores the meaning of interface, requiring the sapphire substrate to meet with . The sapphire substrate is . Lumileds again hides from well settled law that words in a claim cannot be ignored

under the doctrine of equivalents. Accordingly, there is no equivalent of "interface" in Epistar's GB I & GB II and MB I & MB II products.

5. The Accused Products Lack The "Low Resistance Connection" Required In Claims 16 And 18 Of The '580 Patent

Independent claim 16 requires wafer bonding a mirror to the one side of the LED layers, such that the wafer bonding achieves a "low resistance connection." CX-3 at 18:22-28. It is clear that the low resistance connection must be between the mirror and the LED layers. ID at 111. In addition, the low resistance connection must be "achieved" as a result of the wafer bonding. *Id.* A method of bonding that achieves complete insulation between the mirror and the LED layers therefore cannot possibly meet this claim limitation, either literally or as an equivalent. Yet that is precisely the case here.

In the accused OMA products, the alleged "wafer bonding" is carried out using insulating glue layers. RDX-500, 08/07/06 Hr'g Tr. (Dupuis) at 1056:23-1057:4. In addition, and the LED layers. *See infra* at Illustration 4 and Illustration 6. The insulation, including the purported wafer bonding material, prevents the current from flowing between the LED layers and the mirror – *i.e.*, the bonding achieves a high resistance connection In other words, rather than achieving a low resistance connection as required by the claims, the glue bonding in the OMA product achieves the exact opposite. As such, wafer bonding does not "achieve" any "low resistance connection." In the OMA II product the mirror is separated from the LED layers by layers of insulating . *See infra* at Illustration 5 and Illustration 6. In addition, as discussed in connection with claim 8, *supra*, the mirror in the OMA 1I product is

. Therefore, the step of "wafer bonding to . . . the LED layers" is completely absent in the OMA 1I products, and there is no "low resistance connection" between the mirror and the LED layers. For all of these reasons there can be no infringement by the OMA products.

Rather than address these facts, Lumileds again attempts to ignore the express requirements of the claim language. Rather than the wafer bonding causing a low-resistance connection between the mirror and the LED layers, Lumileds attempts to re-write the claim to require only that the wafer bonding "not interfere" with a low-resistance connection elsewhere in the device. LP at 129 (wafer bonding "preserve[s] the current path" through layers formed before wafer bonding). Not "interfering with" a connection within the LED layers does not "achieve" a low resistance connection by the wafer bonding step. Lumileds' argument concedes that the wafer bonding step in these products plays no role whatsoever in the alleged low resistance connection. Lumileds has shown no error in these non-infringement findings by the OMA products.

Lumileds also alleges that the MB and MB II products infringe claims 16 and 18. Again, Lumileds' arguments rely on a refusal to acknowledge the requirements of the claims and the reality of Epistar's manufacturing process. Claim 16 requires that the mirror be "wafer bonded to" the LED layers. CX-3 at 9:27-28. The MB products do not include this step. ID at 104. The facts are undisputed that layers in the GB I and GB II products are over the LED layers. ID at 105; RDX-504; RDX-505; 08/08/06 Hr'g Tr. (Chen) at 1234:12-14. Like the OMA products, other layers, in the MB products, intervene between the layer and the LED layers. *Id.* There is no dispute that

is entirely different from and not equivalent to wafer bonding. *See* ID at 107-8; 08/07/06 Hr'g Tr. (Dupuis) at 994:13-995:6.

Lumileds also argues that other layers, in addition to the

, and that those layers are "wafer bonded" together. LP at 128, 145. However, the claims do not recite "forming a mirror by wafer bonding." Rather, it is the mirror that must be wafer bonded to the LED layers. ID at 105. None of Epistar's products have a mirror that is wafer bonded to the LED layers. Again, Lumileds cannot show infringement by ignoring or re-writing the express requirements of the claims.

6. The Accused Products Lack The Patterning Required By Claims 25, 27 And 28 Of The '580 Patent

The ALJ is correct in finding that the GB I product does not infringe claims 25, 27 or 28. Independent claim 23, from which these claims depend, requires that two layers in an LED joined at an interface by wafer bonding, and further that one of those layers be patterned. CX-3 at 18:63-19:5. The ALJ found no literal infringement of independent claim 23 because

from which there is no removal of material. Secondly there is no wafer bonding. ID at 116. Finally, there is no "interface" between any two layers as a result of wafer bonding. The ALJ also found correctly that there is no infringement under the doctrine of equivalents. ID at 118.

In addition to no infringement of the independent claim, there is no infringement of the asserted dependent claims. Claim 25 limits this patterning by requiring that material from the first layer be removed, to form a depression in the first layer. CX-3 at 19:12-15. Lumileds claims that the "first layer" , but Lumileds admits that no is removed during the alleged patterning. LP at 105. Rather, a layer of

is then removed. *Id.*; 08/07/06 Hr'g Tr.

(Dupuis) at 883:1-6. Again, Lumileds is undeterred by the facts. Despite conceding that the , Lumileds nevertheless maintains that Epistar performs "precisely the form of patterning" required by claim 25. LP at 105. In fact, this is precisely the oppose of the "patterning" required by the claim. Again, Lumileds attempts to show infringement by ignoring the language of its patent claims.[18] The ALJ properly rejected Lumileds' internally inconsistent arguments.

Because the requirements of patterning the first layer, as well as the lack of "wafer bonding" or a wafer bonded "interface" as required by claims 25, 27 and 28 all are missing, there can be no literal infringement of any of these claims. There can also be no literal infringement of claims 25, 27, and 28 under the doctrine of equivalents. For these claims, Lumileds continues to rehash old arguments to ignore claim terms, which were rejected by the ALJ. ID at 117-18. Because claim terms cannot be ignored, there can be no equivalent for "patterning a first surface of the first layer . . .along the interface for the first and second layers" in GB I.

The first and second layers refer to bonded layers such that they have a shared boundary where they meet. Along that boundary optical or electrical properties will vary. In GB I, a not wafer bonded. *See* RDX-502. The and not wafer bonded. Thus, in GB I, none of the layers in those products are wafer bonded to form any interface such that one of its electrical or optical properties will vary along it; otherwise, the terms "wafer bonding" and "interface" would be effectively read out of the claims, which is improper under the doctrine of equivalents.

[18] Lumileds also again misrepresents the record when it claims that "Epistar does not dispute" that the limitations in claims 25, 27 and 28 are met. LP at 104. That statement is simply false. *See* Epistar Post-hearing Br. at 63.

D. When Lumileds' Mischaracterizations Of Epistar's Products Are Corrected, It Is Evident That Epistar Does Not Infringe Any Patent

In describing Epistar's products throughout its Petition, Lumileds repeatedly discusses layers in the products and functions of those layers using claim terms as defined by Lumileds. Because this is as confusing as it is misleading, Epistar describes its products below.

1. The OMA I & OMA II Products

Since 2001, Epistar has spent approximately US$ dollars and nearly three years of effort to develop the OMA LED using glue adhesive. 08/07/06 Hr'g Tr. (Lee) at 959:12-21. Indeed, Epistar has twenty-nine U.S. patents issued on its LED technology and uses these innovations in the design of its products.

To begin with, there is no transparent ("window") layer that "spreads" current, especially to the active layers, in the OMA products. LP at 24-26.[19] Epistar uses , to pass current to the active layers. 08/09/06 Hr'g Tr. (Stringfellow) at 1505:13-1506:7. , as seen in the top views of the OMA I & OMA II shown below:

[19] Lumileds represents that because Epistar admits its products use the transparent window layer and wafer bonding, "Epistar was reduced to arguing that its products did not have a substrate." LP at 3. As demonstrated by Epistar's Petition for Review, this statement is false. Epistar does not employ the transparent window layer of the '718 patent in its products. Epistar argued in part that the specification for the '718 patent excluded ITO from the claim because it criticized ITO as not being entirely satisfactory in that it could not make ohmic contact with the active layers. Epistar's arguments in that regard are bolstered by Lumileds' analysis of the '580 patent and its contention that because the specifications of the '580 patent excludes van der Waals forces. That exclusion is based upon two statements in the specification – "van der Waals' forces are typically ineffective in obtaining the desired ohmic characteristics" (CX-3 at 5:27-30) and "the van der Waals' bond does not generally provide sufficient mechanical strength and does not generally provide sufficient electrical conductivity." (CX-3 at 13:11-13). LP at 82-83. These statements are no more disparaging of van der Waals forces than those the inventors made about ITO. In both circumstances, the thing the inventors criticized should not be included in the claim. *See* Epistar's Petition for Review at 14-19, 27-28.

Top View of OMA I Taken From RDX-500 **Top View of OMA II Taken from RDX-501**

Illustration 2: Comparative Top Views Of OMA I & OMA II

The n-bonding pad (circle shaped contact) and the p-bonding pad (baseball diamond contact) are both formed on the topside of the LED device in OMA I & OMA II. Surrounding the bonding pads . When current enters through the bonding pads, it is directed to that pass current to the active layers. 08/08/06 Hr'g Tr. (Hsieh) at 1278:2-7. This is illustrated below by this sequence of eight frames from Respondent's demonstrative animation RDX-511.

Illustration 3: Current Flow (from RDX-511)

Initially, no voltage is applied (frame 1), and then a voltage is applied showing current moving into the top contact (2). After the current moves into the top contact, it is directed to pass current to the active layers (3 through 7). When current reaches the active layers, the LED lights up (8). Thus, if anything spreads current in OMA I & OMA II, it is , which cannot be considered a transparent window layer because .

Second, Lumileds incorrectly refers to , under the active layers, as "substrates." LP at 24-26. While not drawn to scale, cross-sectional views shown below, taken along the red arrows in the top views, shown above in Illustration 2, accurately reflect the detailed structure for the OMA I:

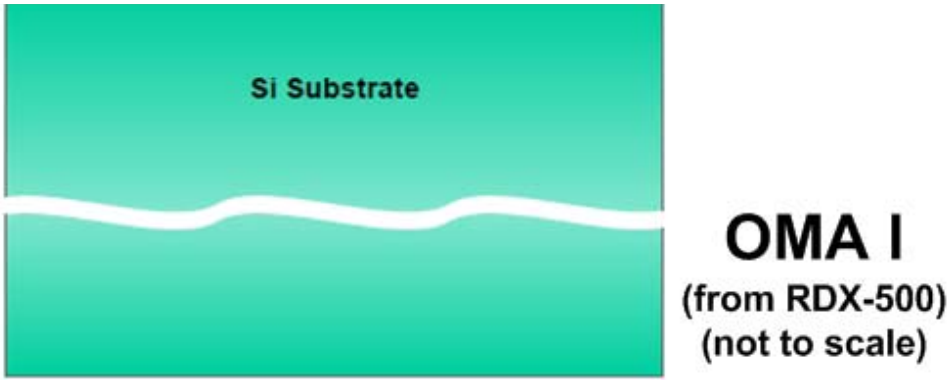


Illustration 4: Cross Section Of OMA I (from RDX-500)

and the OMA II:

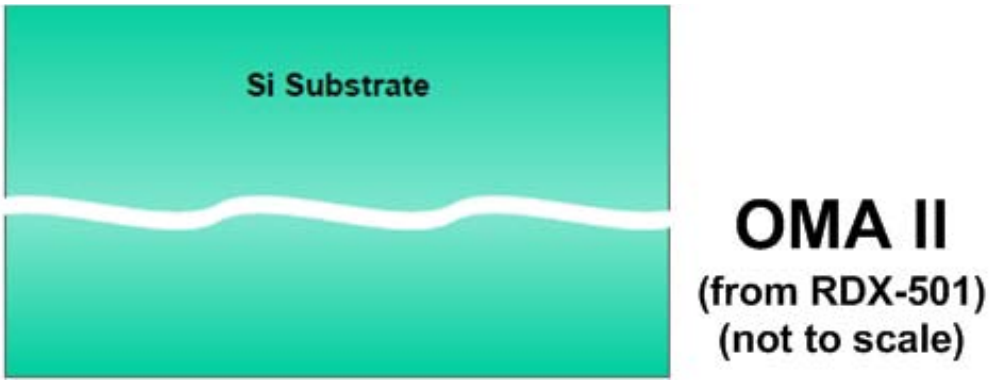


Illustration 5: Cross Section Of OMA II (from RDX-501)

There is no support for Lumileds' conclusion that , and are substrates. Together those layers are a few microns thick (*i.e.*, ~ µm or ,000 Å); they cannot provide the necessary mechanical strength to be considered a substrate and nothing grows on top of them. 08/09/06 Hr'g Tr. (Stringfellow) at 1482:14-1483:17.[20] By

[20] Dr. Stringfellow testified that not even a sheet of paper that is about 50 microns or 50 um thick would provide sufficient mechanical strength to be a substrate in a semiconductor device:

way of contrast, the only substrate in OMA I & OMA II is the light absorbing silicon (Si) substrate, which is μm (,000 Å) thick . The thickness of the Si substrate is orders of magnitude greater than the thicknesses of those layers referred to as "substrates" by Lumileds. Indeed, referred by Lumileds as "substrates"

onto some other substrate, and then attached indirectly to the Si substrate using

, where the other substrate is removed. 08/09/06 Hr'g Tr. (Stringfellow) at 1478:7-1483:17.

Thus, Lumileds' conclusion that the OMA I & OMA II LEDs have an electrical contact to a substrate is clearly incorrect. LP 24-26. As noted above, there is only one substrate in OMA I & OMA II – the Si substrate and it has no electrical contact to it. 08/09/06 Hr'g Tr. (Stringfellow) at 1498:25-1499:4. Both electrical contacts are formed on the topside of the LED device such that current flows laterally between the top n and p electrical bonding pads in a "U" shape. *Id*; 08/10/06 Hr'g Tr. (Jokerst) at 1685:16-1688:10, 1694:10-1695:16.

Third, Lumileds mischaracterizes the ITO contact layer under the bonding pads as a transparent window layer for spreading current. LP at 24-28. That ITO contact layer does no such thing. It makes electrical contact between the bonding pads and

. 08/09/06 Hr'g Tr. (Stringfellow) at 1499:14-20. Current flows from the bonding pads to the ITO contact layer that connects the bonding pads to pass current into the active layers – not the ITO contact layer. 08/08/06 Hr'g Tr. (Hsieh) at 1284:1-5; 08/09/06 Hr'g Tr.

> This piece of paper here is about 50 microns thick, so you can imagine how much support you would get. I mean, they are just not robust enough. Things this thick in a semiconductor are not robust enough that you could process them and make devices out of them.

08/09/06 Hr'g Tr. (Stringfellow) at 1482:21-1483:2.

(Stringfellow) at 1505:13-1506:7. Because ITO has a high resistance with the active layers, without , insufficient current would flow to the active layers at normal driving voltages for the device to light up effectively. 08/08/06 Hr'g Tr. (Hsieh) at 1281:10-16.

Fourth, Lumileds inaccurately describes the mirror in OMA I & OMA II as . LP at 26. In OMA I, there , and, for OMA II, it is . 08/10/06 Hr'g Tr. (Jokerst) at 1697:8-1699:1. Insulating material such as, . Lumileds' expert, Dr. Dupuis, admits this. 08/07/06 Hr'g Tr. (Dupuis) at 1011:12-1013:18; 1056:23-1057:4, 9-12. Similar insulating material such as . *Id.*

Finally, Lumileds inaccurately describes the glue bonding process in OMA I & OMA II as "wafer bonding" and implies that a transparent layer or a mirror is wafer bonded to the active layers in OMA I & OMA II. LP at 24-26. As set forth above, "wafer bonding" within the meaning of the asserted patents does not encompass glue bonding or metal bonding. ID at 19-20. Even if it did, there is no bond to any active layer or epitaxial layer in OMA I & OMA II using . The bonds and interfaces formed by are shown in the detailed cross section below.

Illustration 6: Detail Cross Section Of OMA I & II Glue Bond Layers (from RDX-519)

For OMA I,

, nor do they form an interface. 08/10/06 Hr'g Tr. (Garrou) at 1602:12-23. Likewise, for OMA II,

. As shown above, the only

, but there is no glue bond to it. Furthermore, there are no "edge dislocations" at any of the above bonded interfaces because at least one of the materials is amorphous, which exhibits no crystalline lattice structure to allow for edge dislocations. 08/10/06 Hr'g Tr. (Garrou) at 1605:14-23.

2. The MB I & MB II Products

United Epitaxy Corporation (UEC), which was acquired by Epistar in December 2005, began development of the MB and GB products in late 1998 or early 1999. UEC's efforts to develop these products lasted several years and cost U.S. dollars. 08/08/06 Hr'g Tr. (Chen) at 1212:18:1213:1. Indeed, UEC has forty-six U.S. patents issued on their own LED technology.

Lumileds' mischaracterizations of OMA I & OMA II are also applicable to MB I & MB II. For instance, contrary to Lumileds' characterization, the ITO contact layer used in MB I & MB II is not a transparent window layer that "spreads" current, especially to the active layers. LP at 28-29. Rather, MB I & MB II use

respectively, to pass current to the active layers. 08/08/06 Hr'g Tr. (Chen) at 1222:3-12, 1233:10-1234:6. The top views of the MB I & MB II LEDs, shown at right, illustrate

. For MB I & MB II, the n-bonding pad (circle shaped contact) is on the topside of the LED and a p-bonding pad is formed on the bottom side of the LED. MB II operates in the same way as OMI I & II, which uses

MB I Top View (from RDX-504)

MB II Top View (from RDX-505)

Illustration 7:
Comparative Top Views Of MB I & MB II (from RDX-504 & RDX-505)

to pass current to the active layers. This is shown above in RDX-511. For MB I,

the n-bonding pad

pass current from the n-bonding pad to which then passes current to the active layers of the LED. 08/08/06 Hr'g Tr. (Chen) at 1222:3-16. The create a good ohmic contact with the active LED layers. 08/08/06 Hr'g Tr. (Chen) at 1221:20-22. This is illustrated below by this sequence of eight frames from Epistar's demonstrative animation RDX-512:

Illustration 8: Current Flow (from RDX-512)

Initially, no voltage is applied (frame 1), and then a voltage is applied showing current moving into the top contact (2). After the current moves into the top contact,

(3 through 4). The current then flows

and into the active layers (5 through 7). When current reaches the active layers, the LED lights up (8). As clearly illustrated above, a transparent window layer is not used to spread current to the active layers. Rather,

pass current to the active layers.

The ITO contact layer in MB I & MB II is not a transparent window layer as defined in the ’718 patent. This is evident in the not-to-scale cross-sectional view shown below for MB I and MB II (taken along the red dashed line in Illustration 7, above).

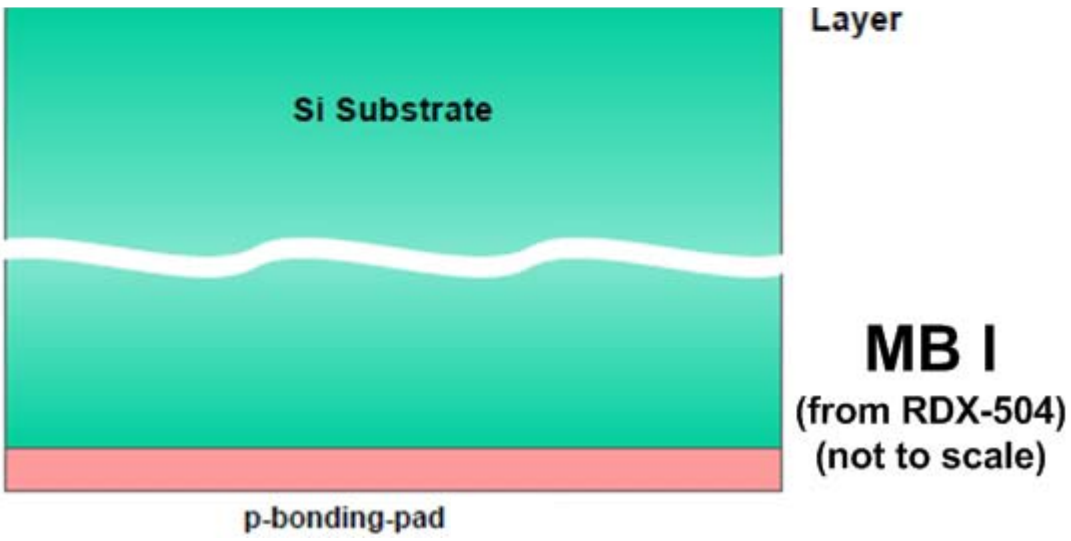


Illustration 9: Cross Section Of MB I (from RDX-504)

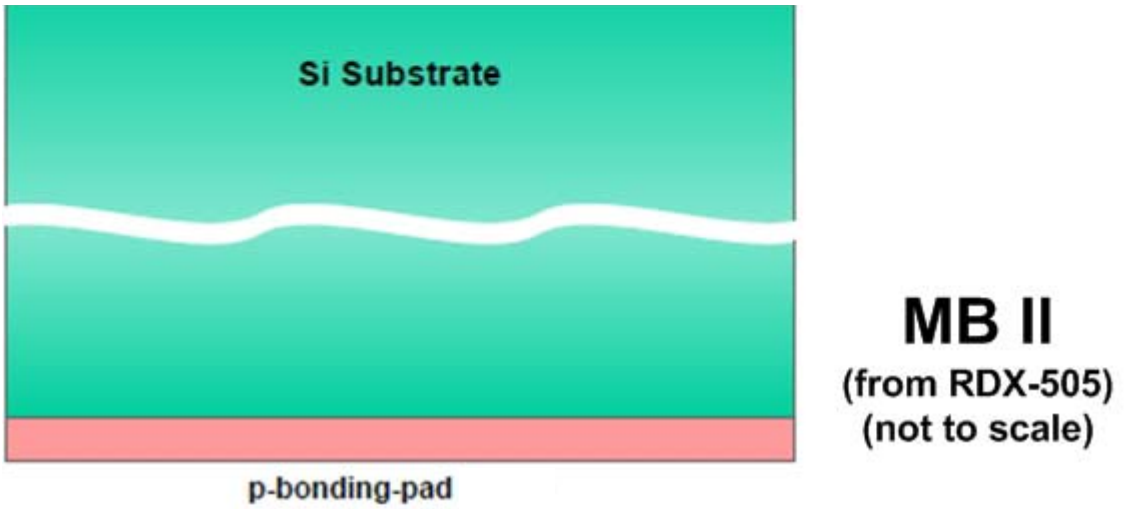


Illustration 10: Cross Section Of MB II (from RDX-505)

In MB I,

. 08/08/06 Hr'g Tr. (Chen) at 1223:20-1224:1. In MB II, like OMA I & OMA II, the ITO contact layer connects the n-bonding pad to . In both MB I & MB II, current does not flow in the areas where the ITO layers comes into direct contact with the upper cladding of the active layers

because ITO is not able to form an ohmic contact with the cladding layer. *Id*. at 1222:24-1223:10. Current goes into the active layers , (and not via the ITO contact layer) for generating light in the active layers. *Id*. at 1222:3-12. Some of the light generated will not escape the device, as it will be blocked

. 08/09/06 Hr'g Tr. (Stringfellow) at 1434:6-11. Like OMA I & OMA II, MB I & MB II uses a silicon Si substrate. *Id*. at 1506:25-1507:2.

Lumileds also mischaracterizes the mirror in MB I & MB II. LP at 26-27. For instance, in MB I & MB II. Instead, . *See* RDX-504 & RDX-505. Lumileds further mischaracterizes the bonding process in MB I & MB II, as producing a "wafer bond." There is no wafer bond formed at any of the layers in MB I & MB II. In the context of the patents-in-suit, a "wafer bond" exhibits "edge dislocations" at the interface of two directly bonded crystalline semiconductor materials – which metal is not. CX-3 ('580 patent) at 4:28-45.

For both MB I & MB II,

. 08/08/06 Hr'g Tr. (Chen) at 1234:12-1235:9. In this process, no semiconductor layers, epitaxial layers, or wafers form any kind of "bond." Rather, the only bond formed is between metal, which cannot constitute a "wafer bond" because metal will not exhibit any "edge dislocations," required by direct semiconductor-to-semiconductor bonding.

3. The GB I & GB II Products

Lumileds' description of the GB I and II devices is likewise inaccurate. Lumileds again mischaracterizes the GB I & GB II LEDs as having a transparent (window) layer that "spreads"

current. LP at 24-26. No such layer exists. For GB I, Epistar uses to pass current to the active layers, and for GB II. 08/09/06 Hr'g Tr. (Stringfellow) at 1432:16-1433:17. shown in the following top views of GB I & GB II.

For GB I & GB II, the n-bonding pad (circle shaped contact) and the p-bonding bad (baseball diamond shape) are both on the topside of the LED. GB I spreads current in the same way as GB I, illustrated in the sequence of eight frames shown in above in RDX-512 – where current passes from the n-bonding pad into the active layers. 08/09/06 Hr'g Tr. (Stringfellow) at 1432:16:1433:17. GB II spreads current in the same way as MB II and OMA I & OMA II using pass current from the n-bonding pad to the active layers – illustrated in the above sequence of frames in RDX-511. 08/08/06 Hr'g Tr. (Hsieh) at 1287:16-1289:6.

Top View of GB I Taken From RDX-503

Top View of GB II Taken from RDX-504

Illustration 11:
Comparative Top Views Of GB I & GB II

used because they make good ohmic contact with the active LED layers whereas ITO does not. 08/08/06 Hr'g Tr. (Chen) at 1221:20-22.

Like OMA I & OMA II, the ITO contact layer in GB I & GB II is not a transparent window layer as described in the ’718 patent. As shown below in the following cross-sectional views for GB I & GB II, (not to scale, taken along the red arrows in Illustration 11), the ITO contact layer connects the n-bonding pad

. 08/09/06 Hr’g Tr. (Stringfellow) at 1432:16-1434:5.

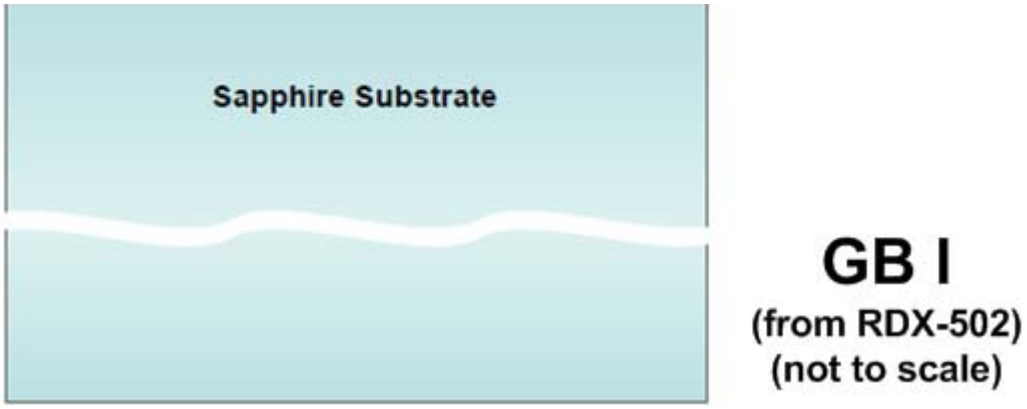


Illustration 12: Cross Section Of GB I (from RDX-502)

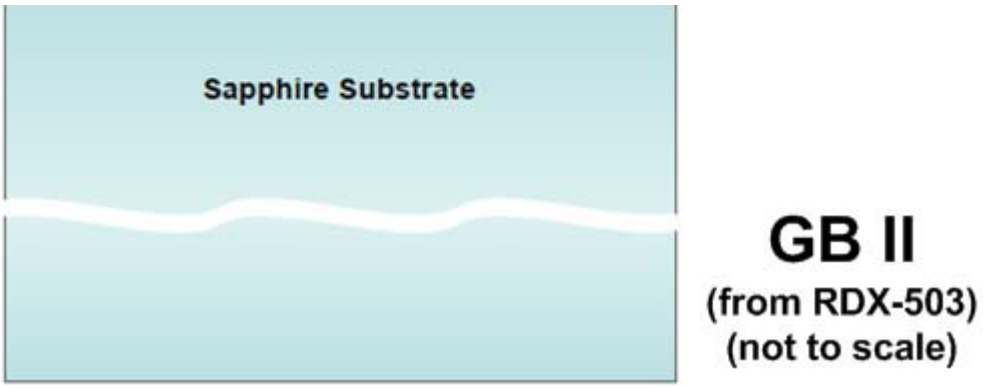


Illustration 13: Cross Section Of GB II (from RDX-503)

In GB I & GB II, there is an interface between the ITO contact layer and upper cladding layer of the active layers, but current does not flow through those interfaces. 08/08/06 Hr'g Tr. (Chen) at 1231:6-14. Because make good ohmic contact with the upper cladding layer, current flows through instead of the ITO contact layer in GB I & GB II. 08/08/06 Hr'g Tr. (Chen) at 1239:23-1240:3.

Like OMA I & OMA II, there is only one substrate (not multiple substrates) in GB I & GB II, the sapphire substrate – and it is has no electrical contact to it. 08/08/06 Hr'g Tr. (Chen) at 1243:21-23. The sapphire substrate is non-conductive because it is an insulator (*i.e.*, cannot be a semiconductor), and is about µm (,000 Å) thick. 08/09/06 Hr'g Tr. (Stringfellow) at 1503:10-21. For the same reasons as OMA I & OMA II,

are too thin (compared to the thick sapphire substrate) to provide enough mechanical strength to be considered a substrate.

Because there is only one sapphire substrate that is an insulator (not a semiconductor) with no electrical contacts, Lumileds incorrectly concludes that GB I & GB II has a substrate with an electrical contact to it. As such, similar to OMA I & OMA II, current does not flow vertically through the sapphire substrate, but laterally in a "U" shape between the n and p bonding pads. However, in GB I & GB II, light generated in the active layers can be directed downward, which can illuminate the sapphire substrate. This innovative technique can increase light output significantly.

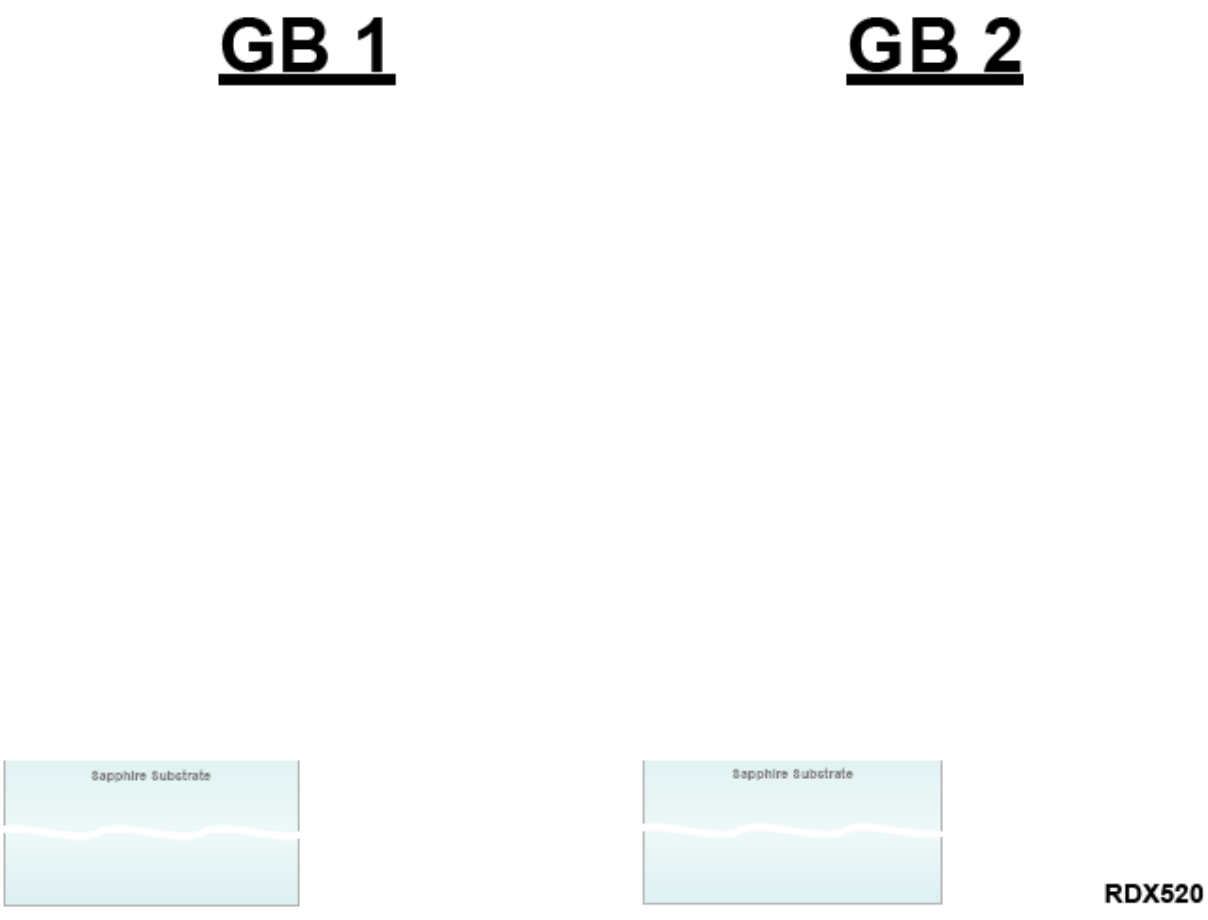


Illustration 14: Detail Cross Section Of GB I & II Glue Bond Layers (from RDX-520)

As with OMA I & OMA II, Lumileds inaccurately describes the glue bonding process in GB I & GB II as "wafer bonding." "Wafer bonding" does not encompass glue bonding. ID at 19-20. Moreover, there is no bond to any active layer or epitaxial layer in GB I & GB II using

shown above in Illustration 14.

In GB I, none of the layers above are directly bonded to the sapphire substrate (Al_2O_3) below form bonded interfaces with it. 08/10/06 Hr'g Tr. (Garrou) at 1603:24-1604:4. Likewise, in GB II, the is not directly bonded to and does not form an interface with it. *Id.* The only interfaces formed are the locations and other layers directly above and below it. At each of the above interfaces and other layers, there is no "wafer bond" because all of those materials are either amorphous or metal and have no crystal lattice structure to produce any edge dislocations – a necessary characteristic of direct or semiconductor-to-semiconductor bonding that creates a "wafer bond." 08/10/06 Hr'g Tr. (Garrou) at 1604:14-23; CX-3 at 4:28-45.

IV. THE ALJ'S EVIDENTIARY RULINGS ARE CORRECT

Lumileds asks the Commission to review and overturn three of the ALJ's evidentiary rulings. First, Lumileds challenges the exclusion of certain scientific testing data that Lumileds did not properly disclose during discovery. LP at 148-158. Second, Lumileds claims that it should have been allowed to extrapolate a doctrine of equivalents argument for "electrical contact to the substrate" in claim 1 of the '718 patent out of Dr. Dupuis' equivalents analysis of the means-plus-function limitation of "electrode means" found in claim 12 of the '316 patent. LP at 55-59. Finally, Lumileds again seeks to exclude Dr. Jokerst's opinions relating to

Toshiba's anticipation of the '580 and '316 patents. LP at 159-164. Because the ALJ ruled correctly on each of these issues the Commission should not disturb his rulings.

A. Lumileds' Testing Data Was Properly Excluded

1. Lumileds Waived Its Right To Challenge The ALJ's Ruling

Lumileds waived its right to challenge the exclusion of its testing data because the ALJ clearly offered it an opportunity to revisit his provisional ruling that excluded the evidence, and Lumileds elected not to. *See* 08/02/06 Hr'g Tr. (Preliminaries) at 26:6-11 ("I'm going to provisionally strike [the exhibits]. I'll give you the opportunity, if you want, to submit a short statement of brief later in the hearing to resuscitate them, but right now, they're stricken from evidence."); *id.* at 28:10-12 ("So I'll give you the opportunity to submit another brief on it, but at this time, I'm striking those exhibits.") (emphasis added). Lumileds never "submit[ted] another brief" as it had been invited to do, nor did Lumileds raise the issue in its Post-hearing Brief, nor even in the special brief that the ALJ requested from the parties concerning evidentiary issues on which he only had provisionally ruled and that the parties were continuing to dispute. Because Lumileds failed to address the evidentiary issue before the ALJ or revisit the issue by seeking to admit the evidence during Dr. Dupuis' testimony, Lumileds has waived the right to use the evidence in this proceeding.

Accordingly, the Commission need not review the merits of Lumileds' argument on this issue.

2. The ALJ's Provisional Ruling Was Correct In Any Event,

Even if Lumileds had not waived the opportunity to admit the tests into evidence, the ALJ's ruling was correct because there is no evidence of how the tests were done, what was tested, the methods used, or any indication of whether or not proper procedures were followed –

in short, there was no reliable sponsor for the exhibits. As such, they were properly excluded from evidence.

At the August 2, 2006 prehearing conference, the ALJ heard extensive argument on five exhibits that Lumileds was seeking to offer into evidence, and to which both Epistar and the Staff objected. *See* 08/02/06 Hr'g Tr. (Preliminaries) at 6:22-30:12 (excluding CX-413C, CX-414C, and CX-423C to CX-425C). Lumileds' incorrectly contends that these exhibits were excluded under Commission Rule 210.33 (19 C.F.R. § 210.33) regarding discovery sanctions. *See* LP at 152-153; *see also id.* at 148-149 (citing *Certain Acesulfame Potassium and Blends and Products Containing Same*, U.S.I.T.C. Inv. No. 337-TA-403, Order No. 23, 1999 WL 176207, at *88-89 (August 14, 1998) and cases therein). The ALJ excluded these exhibits in response to Epistar's and Staff's "High Priority Objections" – *i.e.*, their pre-trial motions *in limne*, which were filed after the close of discovery and immediately prior to the hearing pursuant to the ALJ's procedural rules. *See* Epistar's High Priority Objections at 3-9 (filed July 25, 2006); Staff's Response to Epistar's High Priority Objections at 1-3 (filed July 31, 2006). The objections to these exhibits were lodged pursuant to Commission Rule 210.37(e) (19 C.F.R. § 210.37(e)), and the ALJ's decision to sustain those evidentiary objections was merely a ruling on admissibility under the relevance and reliability standards applicable at a hearing – a standard that is more stringent than the broad scope allowed in discovery. *See* Commission Rule 210.37(b) (19 C.F.R. § 210.37(b)) ("Relevant, material, and reliable evidence shall be admitted. Irrelevant, immaterial, [and] unreliable . . . evidence shall be excluded.") (emphasis added). It was Lumileds burden to demonstrate the admissibility of its exhibits and it failed to do so.

After giving Lumileds a full opportunity to be heard on the objections, the ALJ concluded that the proffered exhibits should not be admitted because Lumileds had not set the

necessary foundation, making them unreliable. *See* 08/02/06 Hr'g Tr. (Preliminaries) at 28:5-9. Specifically, when questioned about these images at his deposition, Dr. Dupuis could not explain (1) where the tests came from, (2) who had performed them, (3) what conditions had existed during the testing, (4) what instructions were provided to the tester, or (5) what methodologies were followed. Dupuis Depo. Tr. (06/22/06) at 13:14-16:23. All Dr. Dupuis knew was what he was told by Lumileds' counsel, and all he could say about the tests was that Lumileds' counsel had controlled them. (Indeed, on the first page of CX-424C, Morgan Lewis attorney Gordon Gex is identified as the "engineer" requesting the analysis). Despite the fact that Dr. Dupuis did not know anything about the tests, Lumileds planned to have him sponsor the testing documents into evidence and form opinions based on them. The ALJ correctly found that such testimony would not be helpful because the reliability of the tests had not been established.

Although the ALJ did not exclude the evidence as a discovery sanction, there was ample support for that result if he had done so.[21] Epistar provided Lumileds with wafer samples of its products in January 2006. Lumileds conducted tests on those products sometime thereafter, but throughout the discovery process, including during 30(b)(6) depositions, it continued to claim that it had no non-privileged testing data relating to its infringement contentions.

42: 4 MR. MA: Counsel, is it Lumileds' position
5 that there is no nonprivileged, nonwork product
6 information regarding any test or studies done on
7 Epistar's or UEC's products?
8 MR. WU: The products accused in this
9 investigation, that's correct.

Dadok Depo Tr. (04/12/06) (emphasis added). Lumileds continued to claim such privilege right up to the hearing. *See, e.g.*, Lumileds' Opposition to Epistar's High Priority Objections, filed

[21] However, the ALJ did have occasion to express general exasperation with Lumileds' discovery tactics, (*see* Order No. 21 at 4), which the Staff described as "trouble[ing]." *Id.* at 2 (quoting Staff's Response to Epistar's Motion for an Order to Show Cause).

July 31, 2006, at 7 ("the other prior tests, including [*i.e.*, not only] those tests performed prior to filing the suit, are opinion work product. . . .").

On the day the parties exchanged expert reports (May 24, 2006), Lumileds produced CX-413C, a poor-quality reproduction of some transmission electron micrograph images ("TEMs") that Dr. Dupuis claimed to have relied on to support his opinions.[22] However, Dr. Dupuis' report made only passing mention of the tests. *See* Dupuis' Expert Report at 45 and 53. On the third and last day of Dr. Dupuis deposition, July 3, 2006, Lumileds produced CX-423, CX-424C and CX-425. CX-424C was produced in late June, without any explanation by Lumileds. Lumileds' counsel would only agree to one additional day of testimony, on July 3rd,and it was only after Epistar reluctantly agreed to this limitation that Lumileds then produced the disputed evidence.[23] Lumileds then did not agree to give Epistar any additional deposition time to examine Dr. Dupuis completely on the newly produced evidence.

Meanwhile, Epistar had propounded several discovery requests designed to elicit information about testing, and which Lumileds was obligated to respond to in full – including by supplementation where necessary. In Epistar's First Set of Interrogatories, which were served on January 23, 2006, Interrogatory No. 33 requested that Lumileds:

> Describe in detail each test, analysis or evaluation of any accused product conducted at any time by or on behalf of Lumileds, including an identification of each accused product that Lumileds has tested, analyzed or evaluated, and for each such product, the identity of all persons involved in such testing, analysis or evaluation, the date(s) when such testing, analysis or evaluation

[22] Lumileds produced a more readable version of CX-413C on June 22, 2006, which was later marked as exhibit CX-414C.

[23] Thus, despite the fact that Lumileds had nearly five full days of deposition to examine Epistar's experts' positions, Epistar was given less than three to cover the same ground in reverse. And, even though Epistar's counsel traveled to Atlanta on July 3rd to accommodate Dr. Dupuis, Lumileds further cut into Epistar's time by beginning the deposition several hours late, knowing that travel plans on the day before the holiday made it impossible to extend in the afternoon to make up for the lost morning time.

> was conducted, and all documents relating to such testing, analysis, or evaluation.

See Lumileds' Response to Epistar's First Set of Interrogatories at No. 33, attached to Epistar's High Priority Objections, filed on July 25, 2006, as Exhibit B (emphasis added). Lumileds refused to respond to this Interrogatory claiming that "it seeks to find information protected from disclosure by the attorney-client privilege and/or work product doctrine." *Id*. at 49. Likewise, in its First Set of Requests for Production (also served on January 23, 2006), Epistar requested documents relating to any such testing. Lumileds again refused to produce responsive documents on the ground that they were privileged. *See* Lumileds' Response to Epistar's First Request for Production Nos. 43-44, 46, 92-93, 101-103, attached to Epistar's High Priority Objections, filed on July 25, 2006 as Exhibit C. Lumileds never supplemented its responses to the interrogatory or document requests, and it fought doggedly to avoid providing the information concerning testing that Epistar had requested.

On June 23, the day after it received CX-424C, Epistar served additional interrogatories on Lumileds, including one that asked Lumileds to identify any witnesses that Lumileds expected to call at the hearing who had not yet been deposed. *See* Epistar's Fifth Set of Interrogatories to Lumileds, attached to Epistar's Motion to Compel, filed on July 7, 2006, as Exhibit 11. Lumileds did not respond to this interrogatory. Finally, in its July 18, 2006, Corrected Prehearing Statement, Lumileds identified, for the first time, six testing-related witnesses who it planned to call at the hearing – none of whom were previously disclosed despite Epistar's direct request for that information in multiple interrogatories. None of these six, previously undisclosed witnesses, who were being proffered to give highly technical and scientific testimony, had been identified as an expert, none had provided a report, and none has been deposed or made available for a deposition. At the hearing Epistar provided the ALJ and

Lumileds a chronology of these events which Lumileds did not dispute. *See* 08/02/06 Hr'g Tr. (Preliminaries) at 13:8-14:8.

None of that is particularly relevant, however, because the ALJ correctly excluded evidence that had no foundation and about which the expert was uninformed. The ALJ's conclusion is well supported by the facts and a fair exercise of his discretion – it should not be disturbed.

B. The ALJ Correctly Struck Dr. Dupuis' Opinion Re: "electrical contact" Under The Doctrine Of Equivalents

Lumileds' arguments that Epistar's OMA and GB products meet the "electrical contact to the substrate" limitation under the doctrine of equivalents should be disregarded because the ALJ's Order No. 28 struck all testimony from Lumileds' expert regarding that position. ID at 69 (referencing Order No. 28). Lumileds admits that it did not raise this "equivalents" argument in its Prehearing Brief, as required by the ALJ's Ground Rule 4(d). LP at 55. The ALJ found that Lumileds' failure to present this position in its prehearing brief prevented Epistar and the Staff from having adequate notice of Lumileds' position, and accordingly struck testimony presented by Lumileds on the issue. Order No. 28 at 7. In reaching that conclusion, the ALJ also rejected the same argument that Lumileds presents to the Commission – that is, somehow, Lumileds' doctrine of equivalents analysis on completely different claim terms ("electrode means") in a completely different patent (the '316 patent) provided notice to Epistar and the Staff that Lumileds would make an equivalents argument for "electrical contact to the substrate" in the '718 patent. ID at 7. The Commission should similarly reject Lumileds' argument.

The is no real dispute with the ALJ's conclusion that Lumileds did not give fair pre-hearing notice of its intent to offer an opinion from Dr. Dupuis that Epistar's GB and OMA products satisfy the "electrical contact to the substrate" limitation of claim 1 of the '718 patent

under the doctrine of equivalents. *See* Order No. 28 at 7; ID at 62 & 69. However, Lumileds argues that it ought to be permitted to use Dr. Dupuis' opinion regarding the "electrode means" limitation of claim 12 of the '316 patent to argue infringement by equivalents of the '718 patent. Epistar and Staff both objected to the attempt to piggy-back onto the "electrode means" term, since that limitation is a means-plus-function limitation, occurs in an unrelated patent, and generally requires a much different legal analysis.

The ALJ nevertheless hear Dr. Dupuis' opinions on both the '316 and '718 patent including his opinion that two top-side contacts are equivalent to one top and one bottom contact. The ALJ cited to Dr. Jokerst's factual explanation of how current flows in Epistar's LEDs and concluded that the two are not equivalent. ID at 69 (citing 08/10/06 Hr'g Tr. (Jokerst) at 1686:3-1688:11). The ALJ therefore drew the legal conclusion that the products were not equivalent to the patent limitation from facts (not opinions) presented about the operation of the devices. The facts do not change regardless of what patent is at issue. Accordingly, even if Dr. Dupuis' testimony had not been stricken, the ALJ would have correctly concluded that Epistar's products do not contain the equivalent of an electrical contact to the substrate. Thus, Lumileds' claim that the ALJ improperly relied on Dr. Jokerst's opinions regarding the '316 patent's claim 12 in finding no infringement by equivalents of the '718 patent claim 1 is incorrect. *See* LP at 55 (citing ID at 69).

C. The ALJ Properly Admitted Dr. Jokerst's Previously Disclosed Opinions Regarding Anticipation By Toshiba

Lumileds next argues that, in addition to admitting the previously undisclosed opinions of Dr. Dupuis, the ALJ also should have excluded Dr. Jokerst's opinions that were disclosed.

The core of this evidentiary issue boils down to whether Lumileds, having been put on notice of Dr. Jokerst's opinions, should have been allowed to bury its head in the sand and later

claim "surprise" when confronted by the answers to questions it blatantly elected not to ask. In brief, in her (Corrected) Initial Expert Report, Dr. Jokerst clearly stated that the Toshiba Application fully disclosed "at least claims 23 and 24 of the '580 patent." (Corrected) Initial Expert Report of Nan Marie Jokerst, Ph.D. at 13-14, attached to Epistar's Prehearing Statement as Exhibit B1 (emphasis added). This was a clear indication to Lumileds that Dr. Jokerst's opinions were not intended to be exclusive with respect to claims 23 and 24, but were in fact still developing, and were likely to extend to other claims in the patent. In her Rebuttal Report Dr. Jokerst further put Lumileds and Staff on notice that she reserved the right to revise or supplement her opinions in light of new testimony or further review of the materials provided to her. *See* Rebuttal Expert Report of Nan Marie Jokerst, Ph.D. at 2, attached to Epistar's Prehearing Statement as Exhibit B2. Lumileds apparently agreed that Toshiba anticipated claims 23 and 24 because after receiving Dr. Jokerst's report but before her deposition, Lumileds dropped its assertion of those claims.

During her deposition, when counsel mentioned that they had dropped claims 23 and 24, Dr. Jokerst informed counsel that additional claims of Lumileds' patents were invalid in light of Toshiba and that she was prepared to discuss her analysis in that regard.

302:23 Q. Looking at your report, my question was
24 directed to your corrected report, so in your report
25 paragraph 36 contains your entire invalidity
303: 1 analysis; is that right?
2 MS. COYLE: Objection, asked and
3 answered.
4 THE WITNESS: No. The Toshiba patent
5 referred – excuse me, in Exhibit 22 may also be
6 applied to some of the '316 claims.
8 Q. Where is that described in your report?
9 A. That is not described in my report.
10 Q. Okay. Now the only chart you provided
11 relating to the '316 patent was for the Gmitter '561
12 patent; is that right, that you currently rely on?

Jokerst Depo. Tr. (6/30/06) at 302:23-303:12 (emphasis added). Thus, Lumileds' was made aware that Dr. Jokerst had reached new conclusions after writing her expert report. Yet, Lumileds chose not to follow-up on the line of questioning. Accordingly, any "prejudice" Lumileds may have suffered with respect to these opinions is entirely of its own making. In addition, shortly after her deposition, and well in advance of the hearing, Epistar provided claim charts to Lumileds explaining Dr. Jokerst's analysis. Lumileds never asked to question Dr. Jokerst on that analysis, and unlike Lumileds' approach to Dr. Dupuis' reliance on the testing documents, Epistar was prepared to allow an additional period of deposition to go forward with Dr. Jokerst. Lumileds was not interested.

Thus, Dr. Jokerst's disclosure is remarkably different than Lumileds' disclosure of the testing documents in a number of ways. First, while the testing documents that were supervised and directed by Lumileds' attorneys, Dr. Jokerst's opinions were based upon her own analysis after she had further studied the patent; second, Epistar provided detailed interrogatory responses setting forth Dr. Jokerst's opinions immediately after Lumileds' failed to ask her opinion in her deposition and Lumileds did not; third, Dr. Jokerst invited Lumileds to ask questions about her opinions and Lumileds refused whereas, Epistar's time with Dr. Dupuis was cut short when it requested the opportunity to further examine him; and finally, Lumileds was able to present an extensive rebuttal to Toshiba (*see, e.g.*, 08/11/06 Hr'g Tr. (Dupuis) at 1969:12-17 ("Q: [h]ave you had an opportunity to look at [the Toshiba] reference to try and form some opinion? . . . A: Yes, I have."),[24] whereas Epistar's expert was not in a position to rebut Dr. Dupuis. *See* LP at 51 (pointing out that Dr. Stringfellow did not offer his own equivalents analysis to rebut Dr. Dupuis', and reaching the absurd conclusion that although not previously disclosed to him,

[24] Dr. Dupuis then proceeded to give extensive rebuttal testimony aimed at Dr. Jokerst's opinions on Toshiba. *See* 08/11/06 Hr'g Tr. (Dupuis) at 1969:18-1986:9.

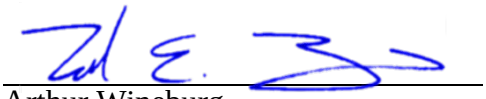
because there was no rebuttal, Dr. Stringfellow must not have disagreed with Dr. Dupuis). Accordingly, contrary to Lumileds' contentions, the two situations are not similar at all and the ALJ's ruling was well within his discretion.[25]

V. CONCLUSION

For the foregoing reasons, the Commission should deny Lumileds' Petition for Review.

Dated: January 29, 2007

Respectfully submitted,



Arthur Wineburg
Colleen M. Coyle
Tobias E. Zimmerman
AKIN GUMP STRAUSS HAUER & FELD LLP
1333 New Hampshire Ave, N.W.
Washington, D.C. 20036
Telephone: 202.887.4000
Facsimile: 202.887.4288

Yitai Hu
Sean P. DeBruine
S.H. Michael Kim
AKIN GUMP STRAUSS HAUER & FELD LLP
2 Palo Alto Square
3000 El Camino Real, Suite 400
Palo Alto, CA 94306
Telephone: 650.838.2000
Facsimile: 650.838.2001

Counsel to Respondent
Epistar Corporation

[25] Lumileds' desire to exclude Toshiba is due to the fact that it unquestionably invalidates asserted claims of the '580 and '316 patents. *See* Epistar's Petition at 28-35. The primary reason the ALJ found Toshiba did not anticipate the '580 patent was because the ALJ accepted Lumileds' argument that Toshiba described bonding at 200°C or more, and that those temperatures would not produce a robust bond. Because the bond was not robust, it could not be a wafer bond. ID at 138-147; Lumileds Post-hearing Brief at 60. Lumileds nevertheless argues that OMA is wafer bonded (*i.e.*, has a robust bond) when it is heated to between °C and °C. LP at 26.

CERTIFICATE OF SERVICE

I hereby certify that on February 8, 2007 a copy of

PUBLIC VERSION OF RESPONDENT EPISTAR CORPORATION'S RESPONSE TO COMPLAINANT'S PETITION FOR REVIEW OF THE INITIAL DETERMINATION

was served on the following as indicated:

Marilyn R. Abbott Secretary U.S. International Trade Commission 500 E Street, S.W., Room 112-F Washington, DC 20436	☐ Via Hand Delivery ☐ Via U. S. Mail ☐ Via Overnight Mail ☐ Via Electronic Mail ☐ Via Facsimile ☒ Via Electronic Docket Filing
The Honorable Sidney Harris Administrative Law Judge U. S. International Trade Commission 500 E Street, S.W., Room 317-H Washington, DC 20436	☒ Via Hand Delivery *(2 copies)* ☐ Via U. S. Mail ☐ Via Overnight Mail ☐ Via Electronic Mail ☐ Via Facsimile
Thomas S. Fusco, Esq. Office of Unfair Import Investigations U. S. International Trade Commission 500 E Street, S.W., Room 401-E Washington, DC 20436	☒ Via Hand Delivery ☐ Via U. S. Mail ☐ Via Overnight Mail ☒ Via Electronic Mail ☐ Via Facsimile
Michael J. Lyons, Esq. Andrew A. Wu, Esq MORGAN, LEWIS & BOCKIUS, LLP 2 Palo Alto Square 3000 El Camino Real, Suite 700 Palo Alto, CA 94306	☐ Via Hand Delivery ☐ Via U. S. Mail ☒ Via Overnight Mail ☒ Via Electronic Mail ☐ Via Facsimile

Carl P. Bretscher, Esq. MORGAN, LEWIS & BOCKIUS, LLP 1111 Pennsylvania Avenue, NW Washington, DC 20004	☐ Via Hand Delivery ☐ Via U. S. Mail ☐ Via Overnight Mail ☒ Via Electronic Mail ☐ Via Facsimile

Melanie Hayes
Paralegal