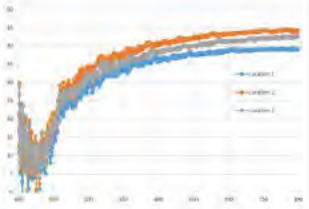
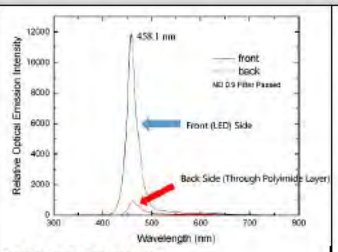
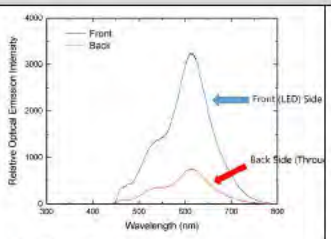
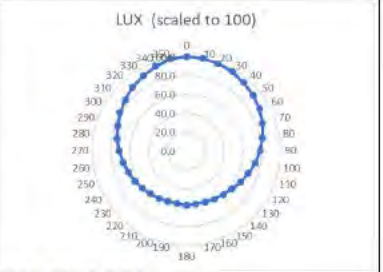
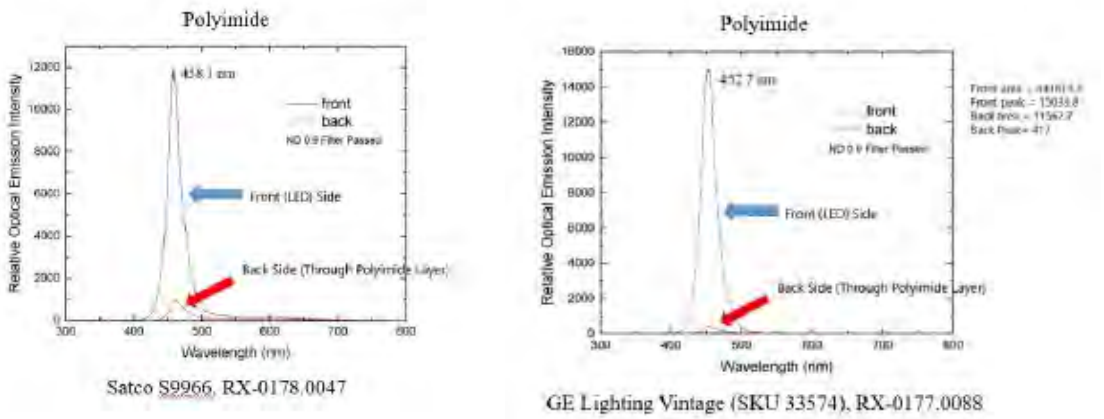
Transmission Testing Data			
Product	**Respondents' Testing (without silicone)**	**Respondents' Testing (with silicone)**	**Complainant's Testing**
	RX-0550.010 (measurement with Shimadzu device); Tr. (Eden) at 978:13-979:4 (1% transmissive at 450 nm).  RX-0550.0012 (measurement with Craic-Micro); Tr. (Eden) at 975:5-20 (10-35% transmissive at 450 nm); 1062:17-1064:22 (difference in results due to variation in region of the surface being tested).		
Satco			
Satco S9966 (representative of Satco S22433)	 RX-0178.0047.	 RX-0178.0048.	 CX-0211.043.

Based on LUX plots taken by EAG and his visual inspection, Dr. Schubert concluded that the Accused Flexible Products' submounts have transparent surfaces. Tr. (Schubert) at 631:13-632:16. However, for the same reasons discussed *supra* part V.B.1.iii.(b) with respect to the Accused Rigid Products, these analyses in fact show that the submounts in the Accused Flexible Products, with the exception of the Feit Accused Flexible Product discussed below, are not "transparent" and therefore do not satisfy this limitation. *See* Tr. (Eden) at 1018:3-16, 969:19-24 (relative light intensity of about 6000 from "front" side of Satco S9966 compared to only 500 from

"back" side), 969:19-24 (relative light intensity of about 15033 from "front" side of GE Lighting Vintage (SKU 33574) compared to only 417 from "back" side); RX-01178.0047; RX-0177.0088.



Satco S9966, RX-0178.0047

GE Lighting Vintage (SKU 33574), RX-0177.0088

The testing, however, shows that the Feit Accused Flexible Product allows nearly the same amount of light to be transmitted through the back surface as is emitted from the front surface, indicating that its submount is transparent:

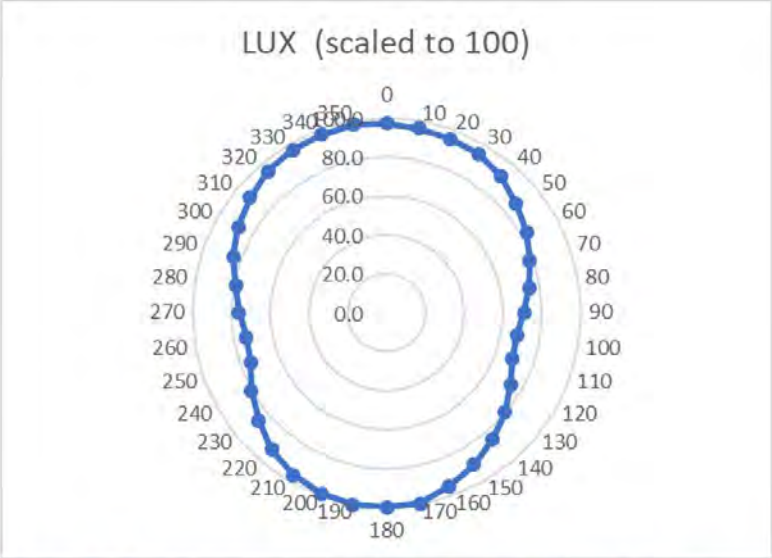
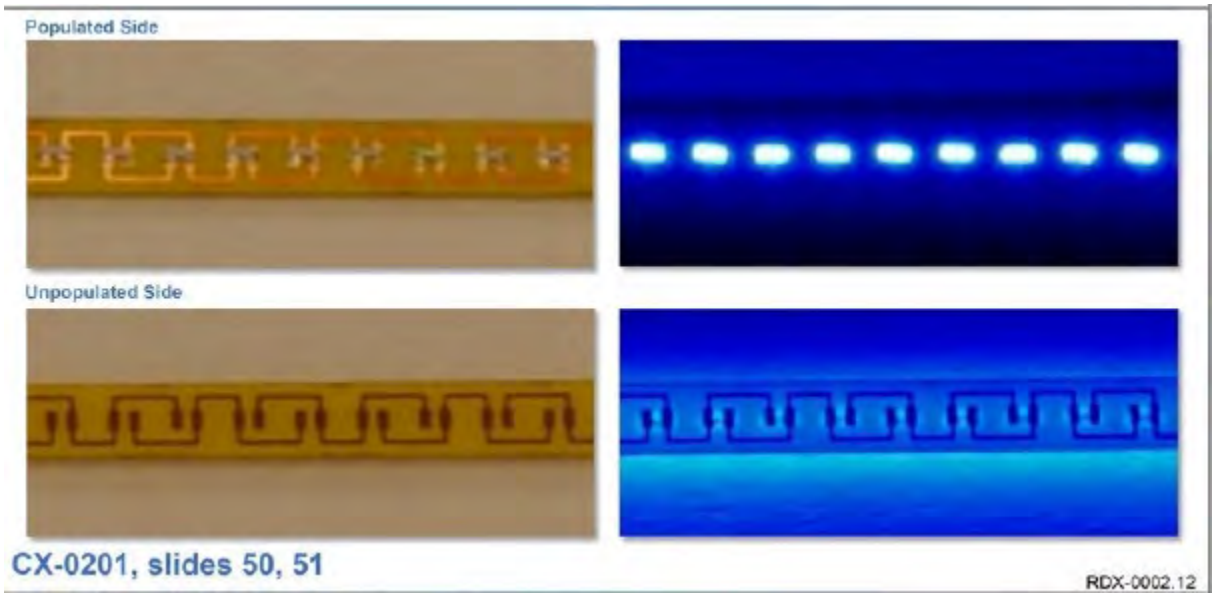


Figure. 71 Plot of angular distribution of light intensity, LUX (scaled to 100)

CX-0201.44 (LUX plot of Feit Vintage ST19 Dimmable, the Feit Accused Flexible Product). Feit argues that this test result is demonstrably erroneous, pointing not only to Professor Shanfield's

analysis that the submount is not transparent, but also to Complainant's own photographs showing that more light was reflected off backing paper than came through the submount. RRB at 89-91; Tr. (Shanfield) at 1134:7-1135:1; RDX-0002.10; CX-0201.46.

CX-0201, slide 46



RDX-0002.12 (excerpt).

Feit argues this shows the fundamental flaw of the LUX plots being measurements with the phosphor encapsulant intact. *See* RRB at 53; Tr. (Eden) at 972:22-973:23; 1097:14-1098:3; RDX-0002.4. Nevertheless, the LUX plots, even if imperfect, alongside the physical evidence and

the photographs of the operating, decapsulated filament, persuasively show that the Feit Vintage ST19 Dimmable meets the "transparent surface" limitation.

iii. Doctrine of Equivalents

For substantially the same reasons discussed *supra* part V.B.1.iii.(b) with respect to the '529 patent, the Accused Rigid Products do not satisfy this limitation under the doctrine of equivalents.

Complainant contends that the Accused Flexible Products satisfy the "transparent surface" limitation under the doctrine of equivalents. CIB at 79; Tr. (Schubert) at 632:19-633:5. Dr. Schubert provided a function-way-result analysis:

- The purported function of the claimed transparent surface is to structurally support the LEDs and to allow light to be extracted through. Tr. (Schubert) at 632:6-10. Complainant contends the polyimide submount performs the same or substantially the same function by structurally supporting the LEDs and allowing light to be transmitted through. *Id*. 633:10-14.
- The purported way the claimed transparent surface performs its function is by providing a surface suitable for supporting LEDs and transmitting light; Complainant contends the polyimide submounts perform the function in the same or substantially the same way. *Id*. 633:15-25.
- Complainant contends the purported result of the claimed transparent surface and the polyimide submount are the same or substantially the same: they result in a surface that structurally supports the LEDs and allows light to be extracted through the surface. *Id*. 634:1-8.

For the substantially the same reasons *supra* part V.B.1.iii.(b).(v), has not persuasively shown that the Accused Flexible Products satisfy this limitation under the doctrine of equivalents. *See* Tr. (Eden) at 1023:7-22.

c. "a cathode on a first end of the transparent surface and an anode on a second end of the transparent surface, wherein the cathode and the anode provide structural support to the transparent surface and are adapted to provide an electrical connection between the light emitting device and a structure outside the light emitting device"

I find that the Accused Rigid Products and the Accused Flexible Products both meet this limitation.

i. Accused Rigid Products

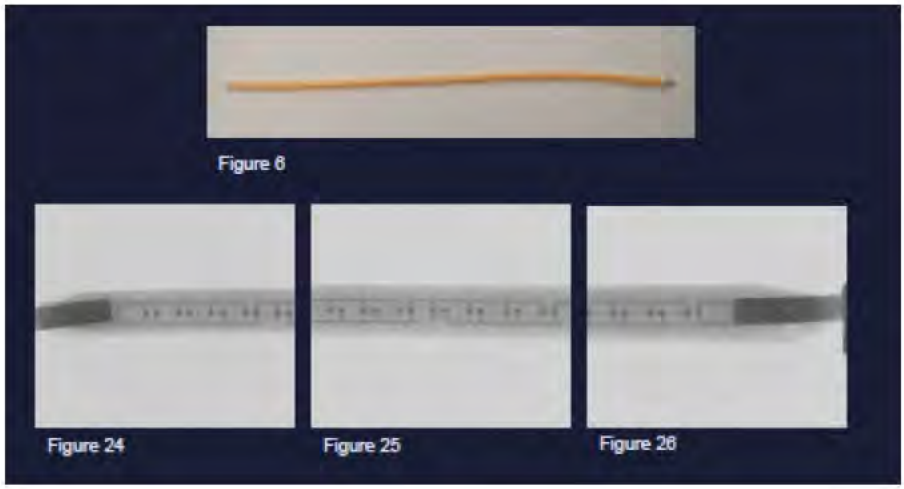
The Accused Products meet this limitation because they have electrodes on the left and right of the images below, one of which is a cathode and the other is an anode, each of which is positioned at the end of the transparent surface, and which are connected to the LED chips via bond wires. Tr. (Schubert) at 702:22-703:7, 703:17-704:2, 706:16-22, 707:5-15.

CDX-0002C.0122 (depicting Satco S29876); CDX-0002C.0123 (other Accused Products). The anode and cathode also provide support to the transparent surface and to the LED chips. Tr. (Schubert) at 703:8-16, 706:23-707:4; CDX-0002C.0124.

There is no dispute that this limitation is met with respect to the Accused Rigid Products. *See* RRB at 94-98.

ii. Accused Flexible Products

The Accused Flexible Products all have anodes and cathodes with the requisite power connections as required by this limitation.

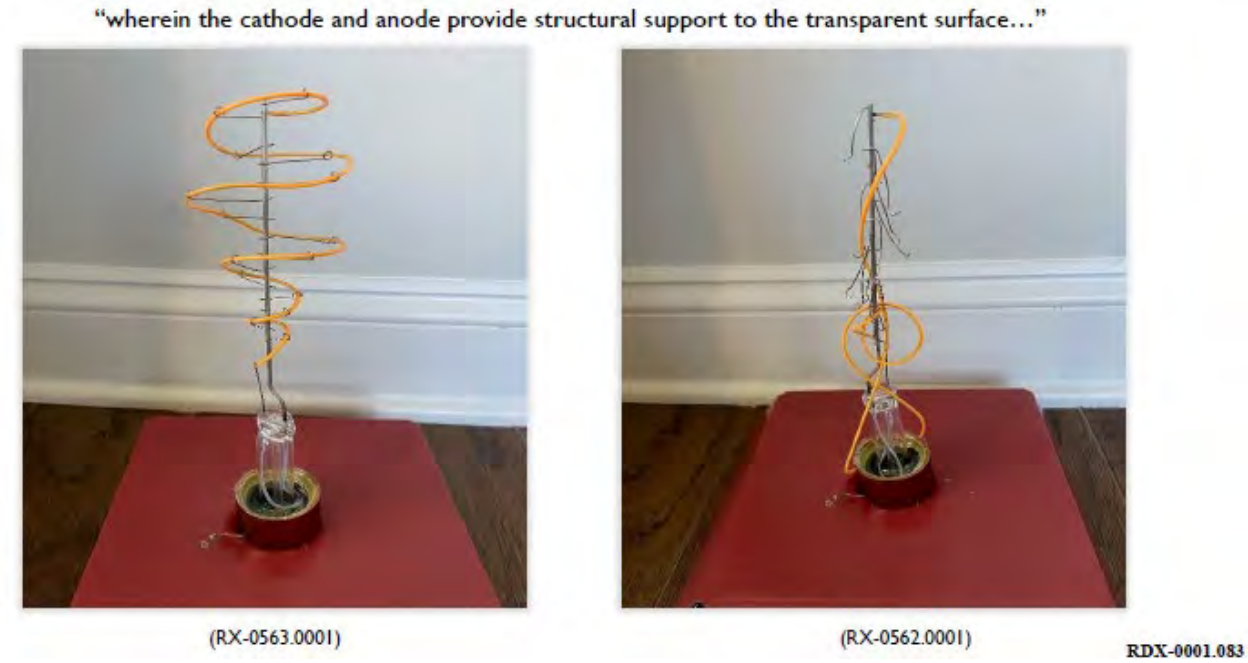


CX-0211 (FIGS. 24-26) (above); CDX-0002C.0189 (below); Tr. (Schubert) at 764:15-765:25, 767:25-768:22; CX-0208, CX-0201, CX-0769, CX-0210 (FIGS. 24-26); CDX-0002C.0190.

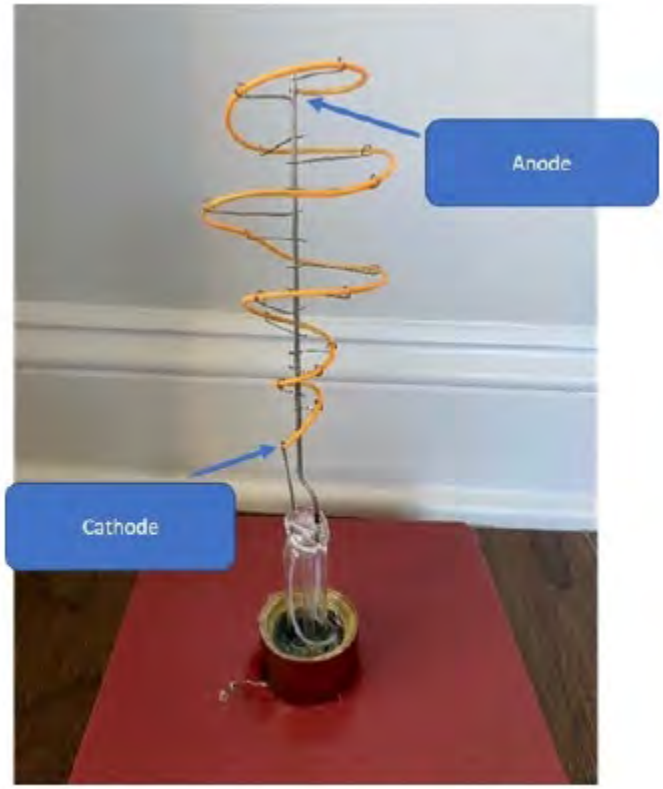
(a) *"provide structural support"*

"Structural support" in the '854 patent means "both the cathode and the anode provide structural support to the" submount. *See* EDIS Doc. ID 733864, Appendix 1 at 1 (agreed claim terms).

Respondents contend, on the basis of their experts' testimony, that the Accused Flexible Products do not meet this limitation because wires projecting out from a central post are what provide the structural support to the filament, rather than the cathode and anode as required. Tr. (Eden) at 1021:21-1023:2; Tr. (Shanfield)at 1183:4-17. Respondents contend the test shown below demonstrates that the Accused Flexible Products do not have an anode and cathode that provide structural support to the transparent surface. Tr. (Eden) at 1021:21-1023:2.



RDX-0001.083. Respondents note that when one clips the wires radiating out from the central post seen in RX-0563.0001, the filament collapses, which in their view demonstrates that the anode and cathode provide "little or no support." Tr. (Eden) at 1022:8-1023:2; Tr. (Shanfield) 1183:4-17 (anode and cathode are not "supplying *substantial* structural support").



Signify Philips A50 ("Flexible")
(RX-0563) (annotated)

But the claim does not require any specific quantum of support, be it "substantial" or some other amount; it requires only that the cathode and anode provide *some* support. As is plainly seen in RX-0562.0001, even with the axial support wires cut, the filament juts horizontally into space, showing that the anode provides support. Likewise, the cathode is shown providing support in RX-0563.0001, as the filament does not droop directly down.

Feit alone argues that the cathode and anode of their Accused Flexible Product are not each "on" a respective "end" of the transparent filament. RRB at 97-98. Feit contends that the anode and cathode are actually only *near* the ends. *Id.*; Tr. (Shanfield) at 1130:13-21; CX-0203.48; CX-0764.48;RDX-0002.7. This argument lacks merit. Even in the exhibits relied on by Feit, the anode and cathode visibly overlap the ends of the filament.

I find that all of the Accused Flexible Products meet this limitation.

d. "at least one III-nitride light emitting diode (LED) comprising a sapphire growth substrate, the LED in mechanical communication with the transparent surface, and the LED and transparent surface configured to extract light emitted by the LED through the transparent surface"

Respondents do not dispute that their products contain the required III-nitride LEDs with sapphire growth substrates. RRB at 99-102. Nor do they dispute that, if the submounts are transparent, the LED is in mechanical communication with it. *Id.* These areas of agreement are supported by competent evidence, and I find accordingly. *See* Tr. (Schubert) at 634:25-635:11.

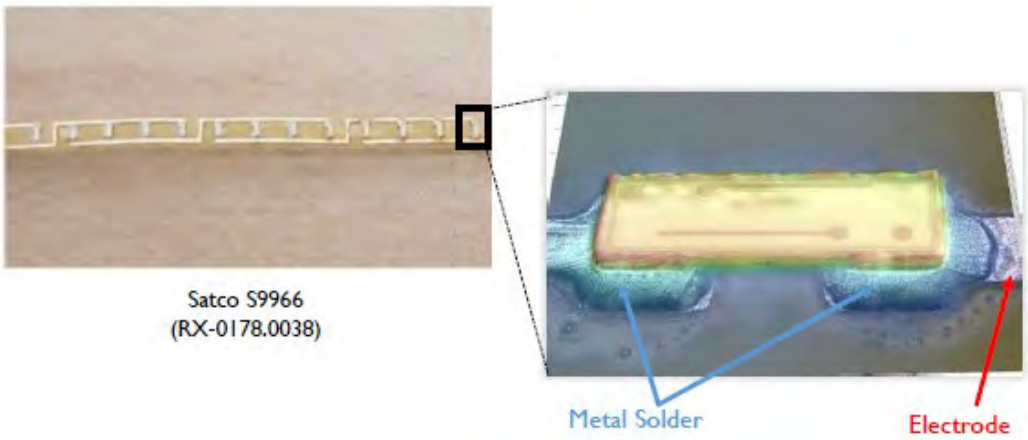
The only areas of dispute are (1) whether the submounts constitute the claimed "transparent surface" and (2) whether the LED and that surface are "configured to extract light emitted by the LED through" that transparent surface.

As discussed above, I find that none of the Accused Products, with the exception of the Feit ST-19 Accused Flexible Product, comprise a transparent surface. *See supra* part VII.B.1.b.

I do find, however, that those products are configured to extract light through the disputed transparent surface (i.e., the submounts). Although the submounts are not transmissive enough to be transparent, for many of the products, not-insubstantial amounts of light pass through the submounts. *Id.* Regardless of whether the surfaces are transparent, the Accused Rigid Products are configured to extract light from them. *See, e..g.*, Tr. (Schubert) at 709:10-711:2, 712:3-713:16.

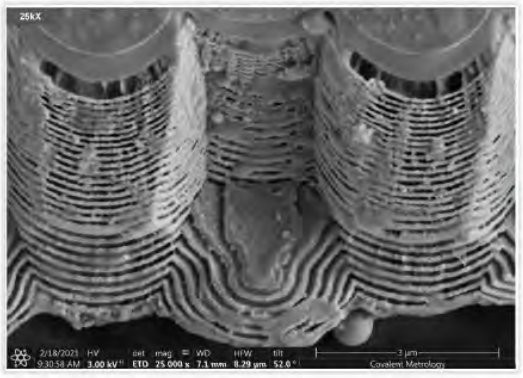
Respondents contend that many of the Accused Products do not meet the "configured for" limitation because the submounts have various features that inhibit the passage of light through the submounts. These features include metallic layers and DBRs on certain products that are meant to reflect light back to the emitter side of the filament. *See* Tr. (Shanfield) at 1098:11-1099:3, 1141:15–1144:18; Tr. (Eden) 1020:1-1021:17; CX-0201.24; CX-0764.28; CX-0765.28; CX-

0766.28; RDX-0002.17–18; RDX-0002.19; RX-0593C.3; RDX-0001.081.. They also include, in the case of the Accused Flexible Products, the electrical traces and solder that generally inhibit light flow. Tr. (Eden) at 1019:16-25.



(RX-0178.0041)

RDX-0001.080.



Element Atomic %	Sample 6
C	23.6
O	41.1
Si	11.0
Al	12.3
Ti	10.4
K	1.4
Cu	0.2

(RX-0182.0010)

RDX-0001.081.

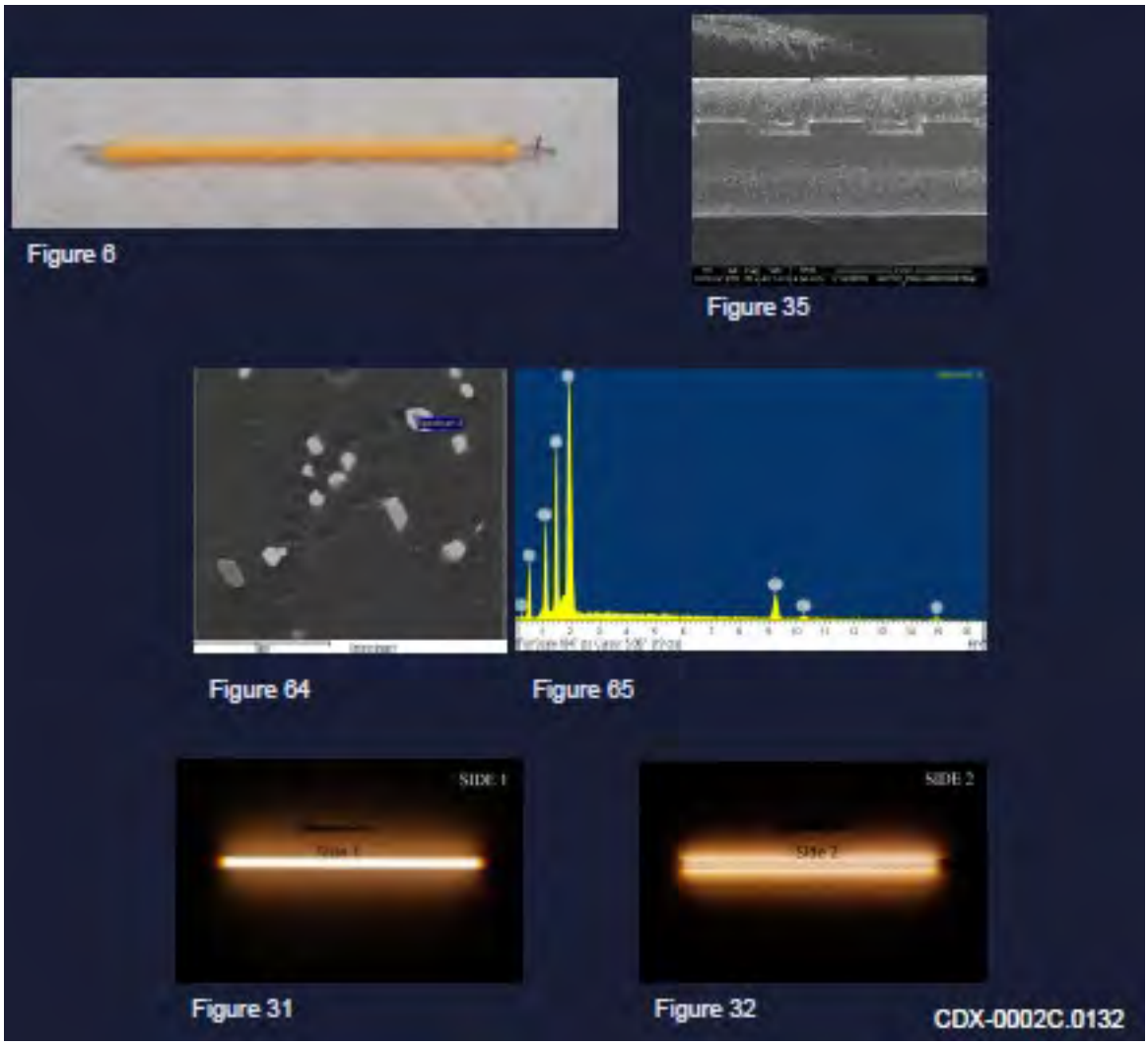
While these components indicate that the Accused Products that possess them are designed to extract more light from the emitter side of the submounts, as noted above, quantitative measurement of the light transmitted through many of the products indicate that light *was* extracted from both sides of each product.

For the reasons discussed above, I find that the Accused Products, except the Feit Rigid - T8C/CL/VG/CA/LED and the Feit Rigid – [redacted] 2700K, which Complainant's testing materially altered, *see supra* part V.B.1.a.ii , satisfy this limitation.

e. "and a molding comprising a phosphor and surrounding the LED, the molding configured to extract light from both a front side of the light emitting device and a back side of the light emitting device."

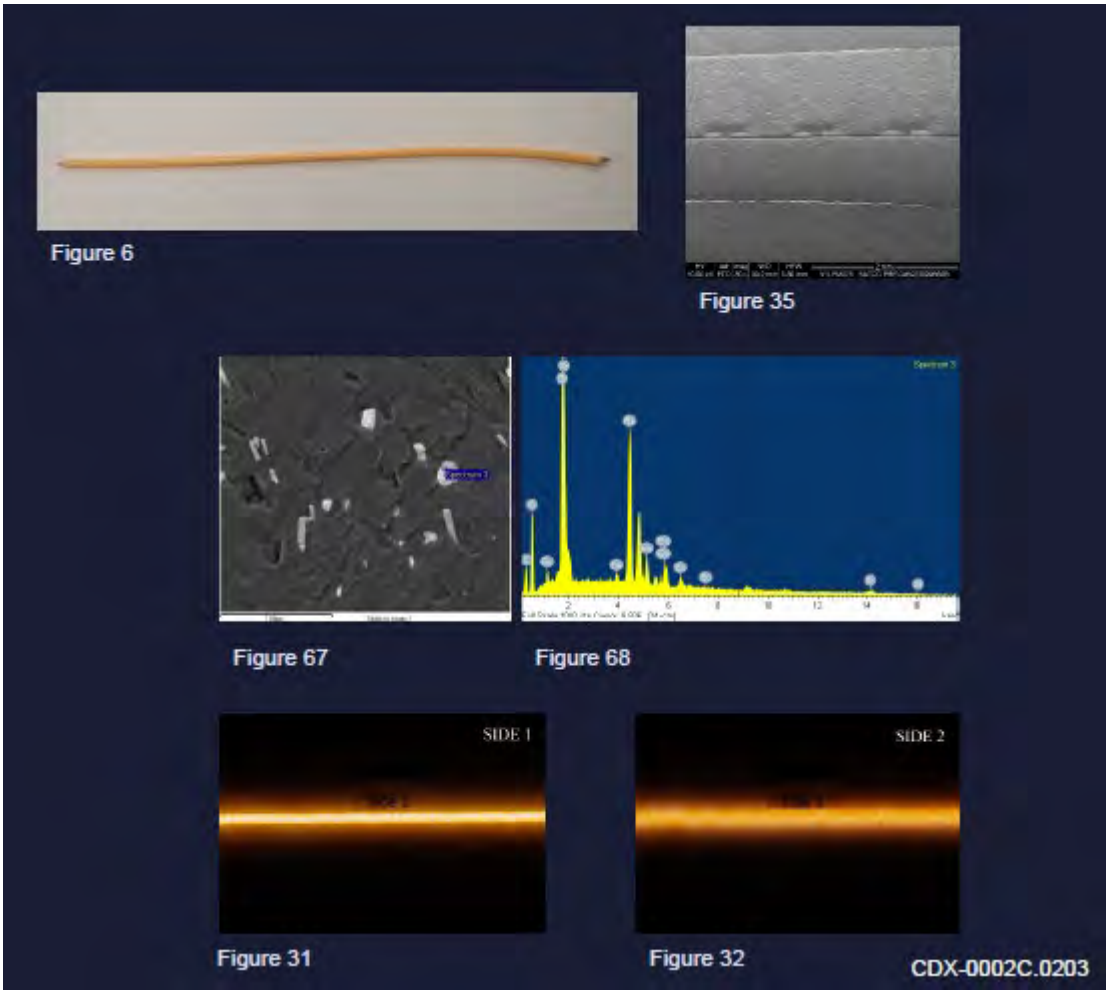
I find that the Accused Products do not satisfy the "molding" limitation.

I previously construed "molding" to mean "a component formed by or as if by a mold." Order No. 39 at 17. Complainant contends that the Accused Rigid Products satisfy this limitation based on the following: 1) photographs which show a silicon surrounding the LEDs that includes a phosphor, which is confirmed by an elemental analysis; and 2) photographs showing that light is emitted from the front and back sides of the molding. Tr. (Schubert) at 715:8-716:21, 718:3-720:5.



CDX-0002C.0132 (depicting Satco S29876); CDX-0002C.0133-.0137.

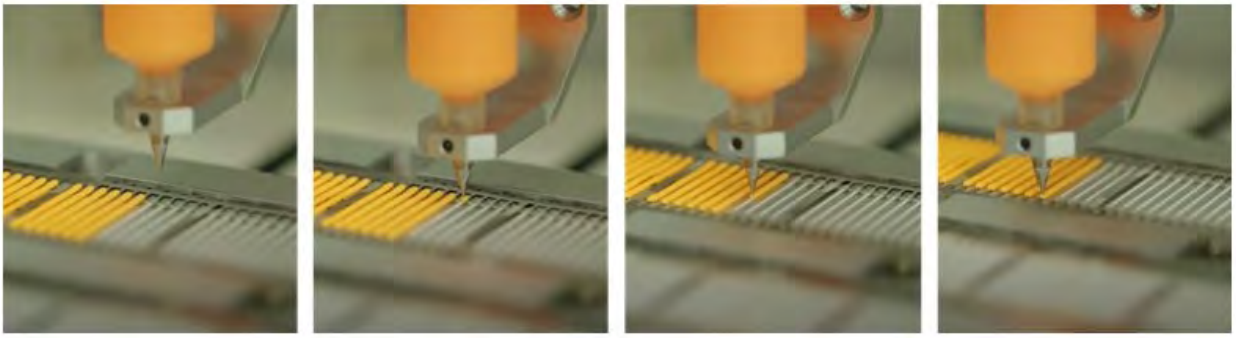
Complainant contends that the Accused Products literally satisfy the "molding" limitation. CIB at 88-96; Tr. (Schubert) at 640:12-19. Dr. Schubert testified that the "molding" in the Accused Products is the yellow material that extends along the length of the filament and has an "approximately circular" cross-section. Tr. (Schubert) at 639:22-640:7. According to Dr. Schubert, because the purported molding's shape is consistent or constant along the length of the filament it is formed as if by a mold. *Id*. at 640:8-11. Complainant relies on similar evidence to argue that the Accused Flexible Products also satisfy this limitation. Tr. (Schubert) at 781:14-782:18, 784:7-785:22.



CDX-0002C.0203 (depicting Satco S9966 analysis); CDX-0002C.0204-.0207.

i. "molding"

There is no evidence that the accused moldings, the yellow silicone/phosphor covering on each filament, are formed by molds. To the contrary, the only evidence suggests that these coatings are deposited onto the filaments from an extruder in a process known in the industry as "glob top." *See* Tr. (Shanfield) at 1150:5-25 (testifying he could tell "right away" that the product was deposited in a glob top process and that in such a process "there's no mold, there's nothing like a mold.").

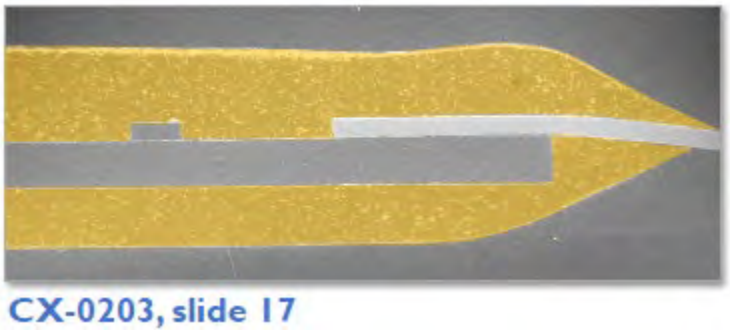


RDX-0002.23 (glob top deposition of silicone/phosophor coating on LED filaments). Thus, the sole question is whether Complainant has shown the accused moldings were formed "as if by a mold." I find that they have not.

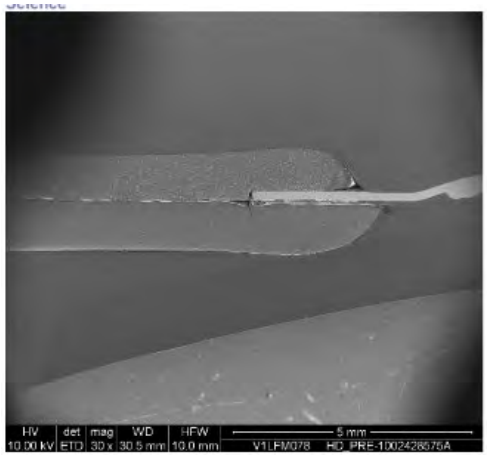
Dr. Shanfield credibly and directly addressed this question, testifying that a person of ordinary skill would "absolutely not" consider a phosphor coat deposited by glob top to be a component formed by or as if by a mold. Tr. (Shanfield) at 1151:1-5. As he put it, this is because "there's no mold. There's nothing resembling a mold involved." *Id.*

Complainant attacks Dr. Shanfield's testimony, claiming it misapplies the construction as focusing on the process, rather than the resulting object. CIB at 92. But the dissimilarity of the accused products, apparently made via the glob-top process, from objects made "as if by a mold" are readily apparent: the yellow silicone coating has random irregularities and an uneven surface, as shown below. Such surface characteristics are not compatible with a finding of being formed "as if by a mold." *See* Tr. (Eden) at 1011:5-23; 1012:19-23. Indeed, the '464 and '529 patents both disparage "non-uniform and typically smooth" phosphor layers that are made "by placing a gel or other liquid form of material onto the chip, and allowing the phosphor to cure" because this process "does not take into account several factors that can be used to increase the efficiency of the LED." '464 patent at 5:42-45; '529 patent at 5:27-30. Those factors include using a "molding . . . which acts as a lens" to assist light extraction. '529 patent at 10:40-41.

RDX-0001.069.



Tr. (Shanfield) at 1150:2-16 (rigid filament).



CX-0201.0017, Tr. (Shanfield) at 1183:19-1185:8 (flexible filament).

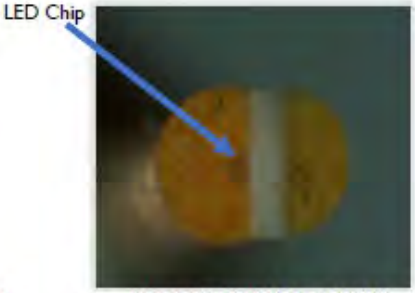
For these reasons, I find that the Accused Products do not satisfy the "molding" limitation.

ii. "surrounding"

Respondents dispute that the "surrounding" limitation is satisfied with respect to certain products because the accused molding does not surround the LED on all sides. Dr. Eden testified that certain Home Depot, Signify, and GVL Accused Rigid Products, and the Signify Accused Flexible Products do not satisfy the "surrounding the LED" limitation because the submounts are not fully surrounded by the silicone coating, as shown below. Tr. (Eden) at 1015:7-1016:11, 1016:24-1017:5.

Respondent/Product	Exhibit
Home Depot Ecosmart 1005 421 841	RX-0175-0080-81; RX-2391
Home Depot King of Fans 1003 939 639	RX-0175-0085-86; RX-2390
Home Depot Air Cool Fan 1003 880 454	RX-0175-0089-90; RX-2393
Signify ST19	RX-0547.0002

Home Depot Ecosmart '841 (RX-2391.0001)



Signify ST19 (RX-0547.0002)

GVL '737 SKU

RDX-0001.074. Respondents contend that the gaps on the sides of these product allow blue light to escape from the LEDs without encountering the phosphor, thereby defeating the "core concept" of 360 white light emission that they contend is the purpose of this limitation. RRB at 108-109; Tr. at 175:12-25.

Respondents' argument creates a limitation not present in the text of the claim. Though such a requirement may be a *better* embodiment of the improvements of the invention, Respondents citing nothing but the extrinsic testimony of one inventor, Professor DenBaars, to impose that limitation on the broader scope of the language. Respondents point to nothing in the

intrinsic record to suggest their proposed understanding of the term "surrounding" comports with how a person of ordinary skill would understand the term.

I find that all of the Accused Products satisfy this limitation, as shown in the images above: each Accused Product's LED are, in fact, surrounded by the phosphor coating. The fact that the phosphor coating does not *completely* surround the submount/transparent surface does not mean that it does not surround the LED, which is all that is required by this claim. Accordingly, I find that that the Accused Products meet the "surrounding" limitation.

f. Conclusion

For the foregoing reasons, I find none of the Accused Products has been shown to infringe the '854 patent.

C. Technical Prong of the Domestic Industry Requirement

For the '854 patent, Complainant only asserts that the Licensee Domestic Industry Products practice the asserted claim.

In addition to the Ceramic Domestic Industry Products and Acclaim Domestic Industry Product, discussed above, Complainant also relies on certain Licensee Domestic Industry Products that have a flexible submount.

Licensee Product Name	Supporting Exhibits
Globe Electric B10	CX-0209 (Report) CPX-0024 (Specimen)
Bullbrite 776512	CX-0195 (Report) CPX-0031 (Specimen)
SSC Filament LED	CX-0216 (Report) CPX-0033C (Specimen)

CX-2213C.0005. Accordingly, the following Licensee Domestic Industry Products are the "Flexible Domestic Industry Products": the Bulbrite product; the Globe Electric product; and the

SSC filament having model number SFW8F24A-01. These products are only alleged to practice claim 1 of the ’854 patent.

1. Rigid Domestic Industry Products

a. Claim 1

I find that the Rigid Domestic Industry Products do not practice claim 1 of the ’854 patent.

i. “A light emitting device, comprising:”

The preamble is not limiting. *See supra* part VII.B.1.a.

ii. “a transparent surface”

Complainant relies on the testimony of Dr. Schubert that the Rigid Domestic Industry Products practice this limitation due to the similarity of the products and for the same reasons he discussed previously. Tr. (Schubert) at 708:3-10. Complainant cites to its infringement analysis for the ’854 patent as support. CIB at 97.

Complainant did not provide competent evidence that the Rigid Domestic Industry Products are identical to the Accused Rigid Products, including for the reasons discussed *supra* part I.E.1. *Certain Memory Modules and Components Thereof*, Inv. No. 337-TA-1089, Comm’n Op. at 24 (April 21, 2020) (EDIS ID 708499) (finding the technical prong not satisfied where expert’s analysis was based on conclusion without explanation that the accused and domestic industry products were identical). Dr. Schubert’s testimony is therefore insufficient.

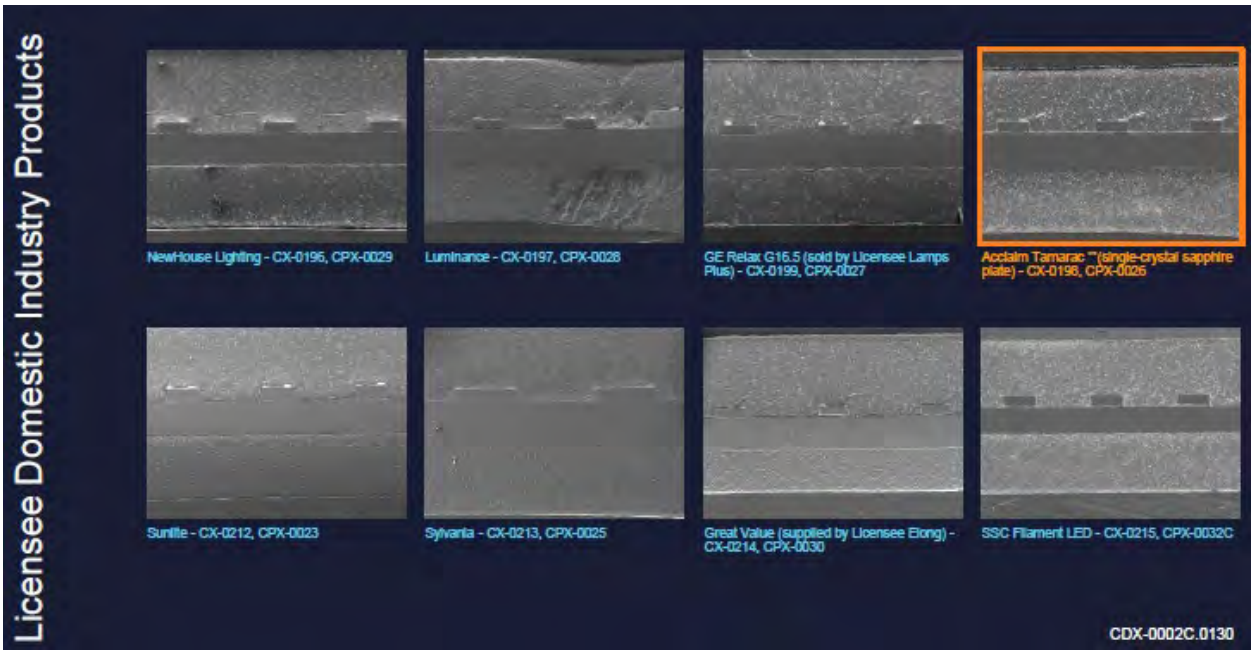
For the same reasons discussed *supra* part V.C.2.I.A.1.a)(1)(b) with respect to "transparent plate," I find that the Ceramic Domestic Industry Products do not practice this limitation, but the Acclaim Domestic Industry Product does.

iii. "a cathode on a first end of the transparent surface and an anode on a second end of the transparent surface, wherein the cathode and the anode provide structural support to the transparent surface and are adapted to provide an electrical connection between the light emitting device and a structure outside the light emitting device"

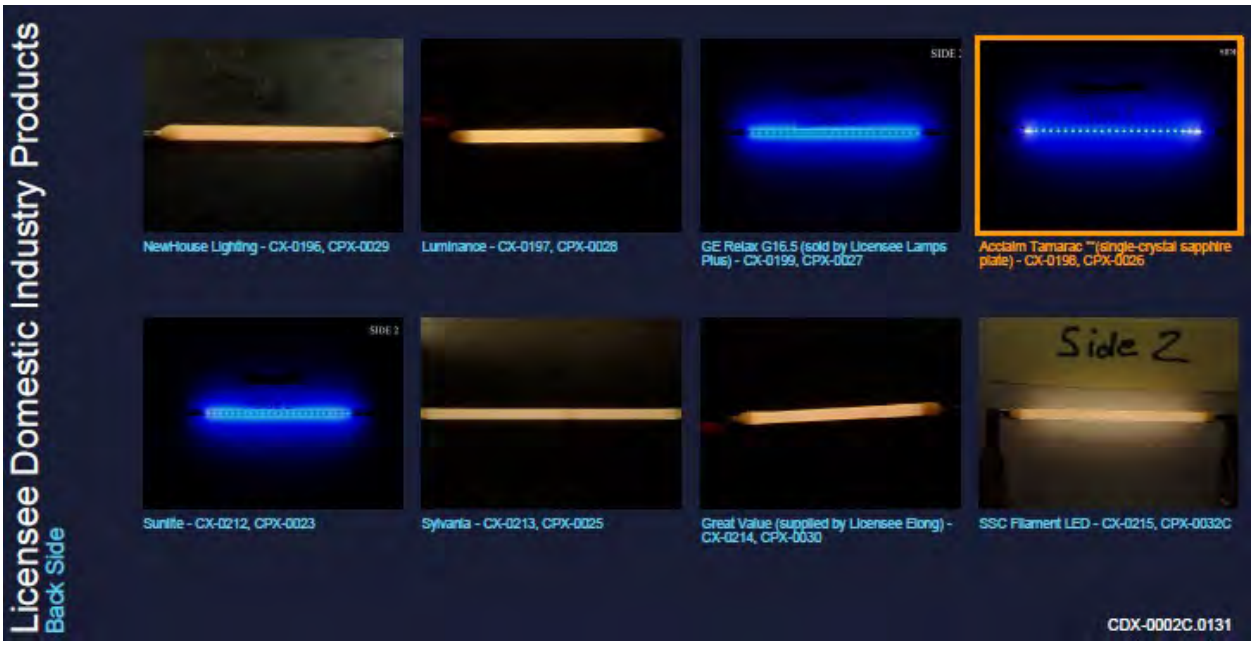
Respondents do not dispute that the Rigid Domestic Industry Products practice this limitation. I find that the Rigid Domestic Industry Products practice this limitation for substantially the same reasons discussed *supra* part VII.B.1.c. Tr. (Schubert) at 708:11-709:9.

iv. "at least one III-nitride light emitting diode (LED) comprising a sapphire growth substrate, the LED in mechanical communication with the transparent surface, and the LED and transparent surface configured to extract light emitted by the LED through the transparent surface"

Complainant relies on the testimony of Dr. Schubert that the Rigid Domestic Industry Products practice this limitation due to the similarity of the products and for the reasons discussed earlier. Tr. (Schubert) at 714:3-10; *see also id*. at 634:25-635:11. Dr. Schubert also testified that the LED die is rigidly connected to the transparent surface and therefore the two are in mechanical communication. Tr. (Schubert) at 714:11-20.



The photographs shown below also indicate that light is transmitted through the submount. Tr. (Schubert) at 714:21-715:7.



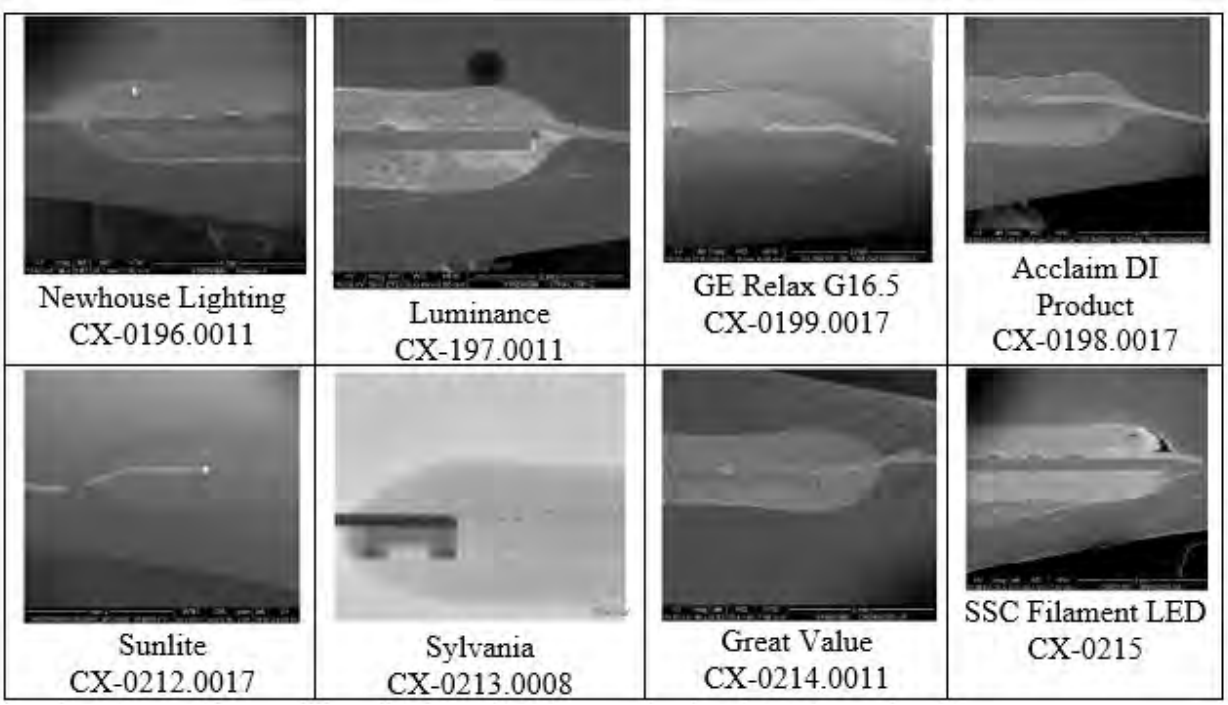
The Ceramic Domestic Industry Products do not practice this limitation for the same reasons discussed *supra* part V.C.2.I.A.1.a)(1)(b) with respect to "transparent plate." Respondents do not dispute that the Acclaim Domestic Industry Product practices this limitation, and I find that the Acclaim Domestic Industry Product practices this limitation for the same reasons discussed *supra* part V.C.2.I.A.1.a)(1)(b) with respect to "transparent plate."

v. "and a molding comprising a phosphor and surrounding the LED, the molding configured to extract light from both a front side of the light emitting device and a back side of the light emitting device."

Complainant once again relies on Dr. Schubert's testimony that the Rigid Domestic Industry Products practice this limitation based on the similarity of the products and for the reasons discussed earlier to satisfy this limitation. Tr. (Schubert) at 721:3-723:9; CDX-0002C.0138-.0142.

As with the Accused Products, the Rigid Domestic Industry Products' yellow silicone coating appears to have random irregularities/an uneven surface, as shown below, and therefore it

is not a component formed by or as if by a mold. *See supra* part VII.B.1.e. i. These irregularities can be seen clearly in the images below.



Accordingly, I find the Rigid Domestic Industry Products do not practice the "molding" limitation.

2. Flexible Domestic Industry Products

a. Claim 1

I find that the Flexible Domestic Industry Products do not practice claim 1 of the '854 patent.

i. "A light emitting device, comprising:"

The preamble is not limiting. *See supra* part VII.B.1.a..

ii. "a transparent surface"

I find that the Flexible Domestic Industry Products do not satisfy the "transparent surface" limitation. Complainant relies on Dr. Schubert's testimony that the Flexible Domestic Industry Products practice this limitation "[b]ased on the type of transparent surface, polyimide." Tr. (Schubert) at 769:1-9.

Respondents argue that the Flexible Domestic Industry Products have an opaque surface based on a visual inspection. RRB at 110.

As discussed supra part V.B.1.iii.(b), transmission testing results are the most relevant evidence of a materials transmissivity, because they show how much light is being transmitted, which is critical to determining whether a material is "transparent." The sole quantitative transmission analysis Complainant presented for these products, a LUX plot for the Globe Electric Flexible Domestic Industry Product, shows that it does not have a transparent surface, transmitting only about 60% of the light incident on it through.

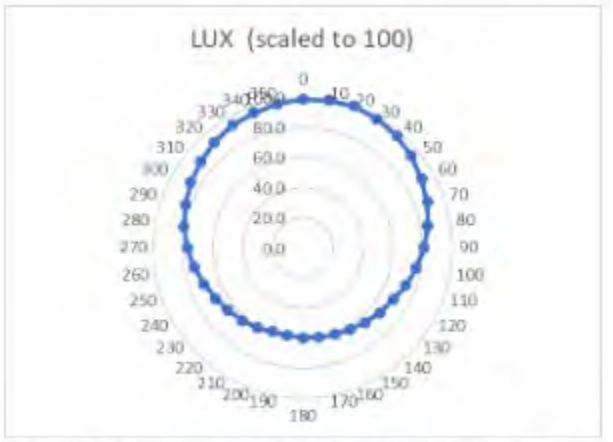


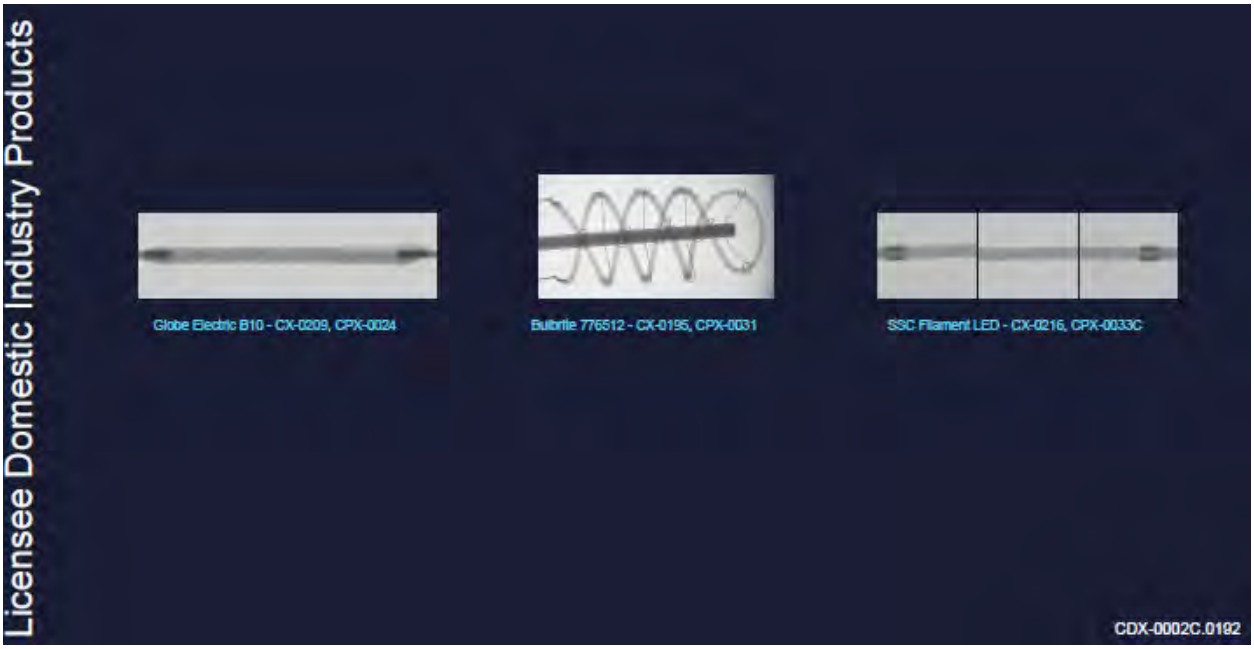
Figure. 71 Plot of angular distribution of light intensity, LUX (scaled to 100)

CX-0209.0043.

Accordingly, I find that the Flexible Domestic Industry Products do not meet the "transparent surface" limitation.

iii. "a cathode on a first end of the transparent surface and an anode on a second end of the transparent surface, wherein the cathode and the anode provide structural support to the transparent surface and are adapted to provide an electrical connection between the light emitting device and a structure outside the light emitting device"

Complainant contends that the Flexible Domestic Industry Products practice this limitation based on the following: 1) photographic evidence shown below and the same reasoning discussed earlier, and 2) the similarity of the products. CIB at 102-104. Respondents do not dispute this limitation. RRB at 109-110. I find that this limitation is met for substantially the same reasons discussed *supra* part VII.B.1.c.ii.I.A.1.a)(1)(a) as well as the images below and Dr. Schubert's testimony. Tr. (Schubert) at 769:10-25, 771:3-11.



CDX-0002C.0192.

iv. "at least one III-nitride light emitting diode (LED) comprising a sapphire growth substrate, the LED in mechanical communication with the transparent surface, and the LED and transparent surface configured to extract light emitted by the LED through the transparent surface"

Complainant again relies on the testimony of Dr. Schubert to show satisfaction of this limitation. Dr. Schubert testified that the Flexible Domestic Industry Products practice this limitation based on the following: 1) the similarity of the products; 2) the same reasons discussed earlier; 3) photographic evidence showing light being emitted out of the back side of the filament. Tr. (Schubert) at 780:3-781:11; CDX-0002C.0200-.0202. Respondent does not appear to contest this limitation is satisfied by the Flexible Domestic Industry Products apart from the requirement of a transparent surface. *See* RRB at 109-110.

For the same reasons discussed supra *part* VII.B.1.d, I find that the Flexible Domestic Industry Products practice this limitation.

v. **"and a molding comprising a phosphor and surrounding the LED, the molding configured to extract light from both a front side of the light emitting device and a back side of the light emitting device."**

Dr. Schubert testified that the Flexible Domestic Industry Products practice this limitation based on the following: 1) the similarity of the products, 2) the same reasons discussed earlier, 3) microscopic and chemical analysis showing the presence of phosphor in the molding; and 4) photographs of the back side of the filament. Tr. (Schubert) at 787:9-789:6; CDX-0002C.0208-.0211.

For the same reasons discussed *supra* part *See supra* part VII.B.1.e. i, I find that the Flexible Domestic Industry Products do not practice the molding limitation.

D. Validity

Respondents contend claim 1 of the '854 patent is anticipated by each of the Yamazaki, Minato, Uemura, Tamaoki, and Tanda references.[24] Alternatively, Respondents contend claim 1 of the '854 patent is rendered obvious by combinations of each of their presented primary purportedly anticipatory references with other, secondary references addressed below.

In addition to the previously discussed prior art, Respondents also challenge the '854 patent as lacking sufficient written description under 35 U.S.C. § 112, First Paragraph. RIB at 64.

My analysis of each ground for invalidity follows.

1. Written Description

Respondents contend that the limitation requiring "a cathode on a first end of the transparent surface and an anode on a second end of the transparent surface, wherein the cathode and anode provide structural support to the transparent surface" is not supported by adequate written description, thereby rendering claim 1 invalid. Complainant and Staff disagree. SIB at 174; CRB at 53.

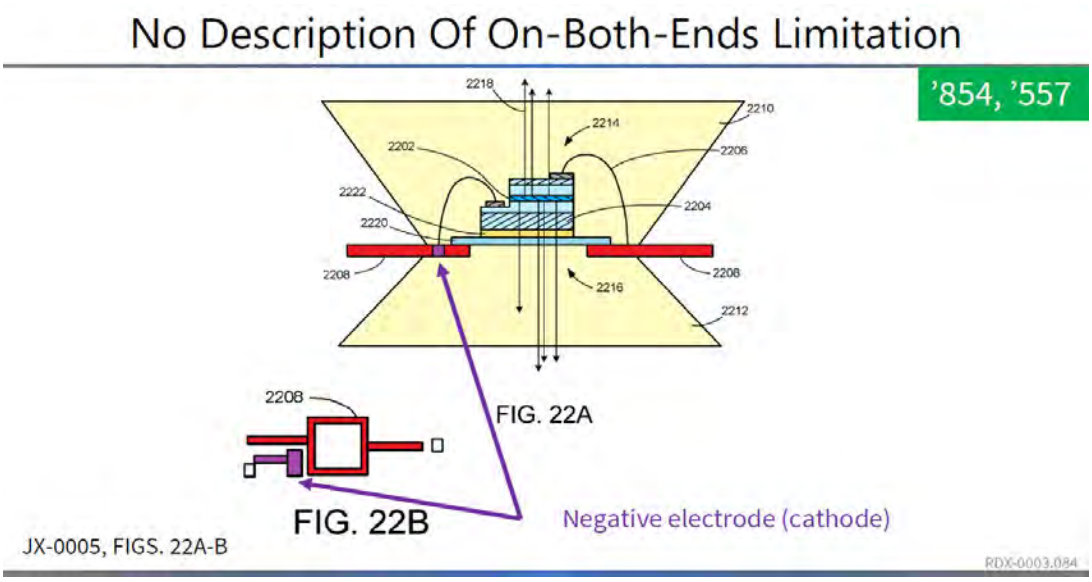
Section 112 of the Patent Act (Pre-AIA) requires that a patent specification "shall contain a written description of the invention . . . in . . . full, clear, concise, and exact terms." 35 U.S.C. § 112, First Paragraph. The written description requirement has several policy objectives. One purpose is to convey to the public what the applicant claims as the invention. *See Regents of the Univ. of Cal. v. Eli Lilly*, 119 F.3d 1559, 1566 (Fed. Cir. 1997), *cert. denied*, 523 U.S. 1089 (1998). Another objective is to "ensure that the inventor had possession, as of the filing date of the

[24] On November 10, 2021, the PTAB issued a discretionary denial of a petition for *inter partes* review filed by Satco that relied on some of the same references. EDIS Doc. ID at 756410 (citing IPR2021-00794). Among other factors, the board relied on the imminence of determination in this investigation to deny review. *See id.* at 29-30.

application relied on, of the specific subject matter later claimed." *Application of Wertheim*, 541 F.2d 257, 262 (C.C.P.A. 1976); *Billups-Rothenberg, Inc. v. Associated Reg'l & Univ. Pathologists, Inc.*, 642 F.3d 1031, 1036 (Fed. Cir. 2011) ("[t]he written description requirement exists to ensure that inventors do not attempt to preempt the future before it has arrived").

When evaluating a written description defense, the Commission conducts "an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art" to determine whether "the inventor actually invented the invention claimed." *Rivera v. Int'l Trade Comm'n*, 857 F.3d 1315, 1319 (Fed. Cir. 2017) (quoting Ariad, 598 F.3d at 1351). To satisfy the statute, an applicant need not describe "every conceivable and possible future embodiment" of the invention. *Cords Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1365 (Fed. Cir. 2003). Whether a specification complies with the written description requirement of § 112(a) is a question of fact. *Rivera*, 857 F.3d at 1319. When raising a written description defense, the accused party "must show a lack of written description by clear and convincing evidence." *Id*.

The terms "anode" and "cathode" do not appear in the '854 patents' specification. Tr. (Lebby) at 1273:10-15. Respondents note that Figs. 22A and 22B, the only figures depicting a cathode, the cathode is not connected to the transparent surface/sapphire plate. Tr. (Lebby) at 1272:11-1273:9.



As Dr. Schubert persuasively testified, however, a person of ordinary skill would understand that a lead frame can have a variety of shapes and would not be limited to the specific shape shown in those figures. Tr. (Schubert Reb.) at 1340:3-14. As the Federal Circuit has repeatedly instructed, an applicant need not describe "every conceivable and possible future embodiment" of the invention to satisfy the written description requirement. *Cords Corp.*, 339 F.3d at 1365.

I find that Respondents have failed to meet their burden of showing that the '854 patent lacks adequate written description.

2. Priority Date

The family of the '854 and '557 patents claim priority to the '447 Provisional application, which was filed on December 11, 2006. According to Respondents, the '447 Provisional does not describe the anode/cathode limitation discussed above for reasons closely tracking their arguments for lack of written description. RIB at 65.

When the anode/cathode limitation first appeared during prosecution of application number 16/422,323 ("'323 application"), filed on May 24, 2019 and issued as U.S. Patent No. 10,454,010 ("'010 patent"), the Examiner rejected the language for lack of written description support. RX-

0011.0001-9. During a telephonic interview with the Examiner, the Applicant discussed anode/cathode disclosures that could be found in Figure 22 of the '447 Provisional and Figure 5 of an unrelated provisional, the '454 Provisional. *Id*. at .0011.

After the telephonic conference with the Examiner, an amendment of the description of Figs. 22A and 22B successfully overcame the Examiner's rejection. *Id.* at .0011.13-15. The Examiner acknowledged that the '447 Provisional provided sufficient support for the anode/cathode limitation without introducing any new matter and allowed the '323 application, which issued as the '010 patent. *Id.* The allowance of the '323 application in view of the above-referenced amendment undermines Respondents' arguments.

The Examiner's remarks indicate that a person of ordinary skill would find that the '447 Provisional was sufficient by itself to provide adequate written description support for the anode/cathode limitation. Thus, whether the unrelated '454 Provisional was or was not properly incorporated under Rule 1.57, as argued by Respondents, *see* RIB at 65, is moot.

Based on the foregoing, I find that the '854 patent is entitled to its claimed priority date.

3. Yamazaki (RX-0828)

Respondents and Staff argue that the asserted claim of the '854 patent is invalid based on Yamazaki. RIB at 52-54; 170-171; Tr. (Lebby) at 1220:10-1228:11. Complainant only affirmatively disputes that Yamazaki discloses "wherein the cathode and anode provide structural support to the transparent surface." CPB at 326; CRB at 43.

1. A light emitting device, comprising:

> A transparent surface, a cathode on a first end of the transparent surface and an anode on a second end of the transparent surface, <u>wherein the cathode and anode provide structural support to the transparent surface</u> and are adapted to provide an electrical connection between the light emitting device and a structure outside the light emitting device;

> At least one III-nitride light emitting diode (LED) comprising a sapphire growth substrate, the LED in mechanical communication with the transparent surface, and the LED and transparent surface configured to extract light emitted by the LED through the transparent surface; and
>
> A molding comprising a phosphor and surrounding the LED, the molding configured to extract light from both a front side of the light emitting device and a back side of the light emitting device.

'854 patent at claim 1 (emphasis added).

Respondent contends that Yamazaki satisfies all of the limitations of claim 1 of the '854 patent for substantially the same reasons as it satisfies claim 1 of the '464 patent. RIB at 52-54; *see* Tr. 1220:13-19.

For substantially the same reasons discussed *supra* part VI.B.1, I find that Yamazaki teaches most of the limitations of claim 1 of the '854 patent. Yamazaki's Figure 1 shows a surface-mount LED package whose leads are wrapped around the ends of the glass/sapphire plate. A person of ordinary skill would understand that these leads are a cathode and an anode, and that they provide structural support to the plate at each end. Tr. at 1221:20-1222:17; RDX-0003.025. Additionally, these leads are used to mount the package onto a circuit board, providing both the physical and electrical connection between the package and the board. Tr. at 1225:10-21. Thus, they provide structural support because they are how the LED package is physically attached to the circuit board. *Id*.

The parties agree, however, that the sapphire growth substrate is not expressly disclosed, but Respondents contend that limitation is obvious. Complainant disputes that Respondents have presented sufficient evidence of such obviousness, and indeed, the record appears to be devoid of any evidence of such obviousness. CRB at 42-43. I find that Respondents have failed to show that Yamazaki discloses the required sapphire growth substrate limitation and therefore does not anticipate the '854 patent.

Alternatively, for the same reasons discussed *supra* part VI.B.1, I find that Yamazaki renders claim 1 of the '854 patent obvious in combination with Uemura. Uemura expressly teaches that its LEDs are blue GaN-based LEDs and is grown on a sapphire substrate. RX-0779 at 4:63-65, 7:6-9, 7:33-40, Table 1. Uemura also discloses a cathode and anode providing support, as required. *Supra* part VI.B.1.

4. Minato (RX-0723)

Respondents and Staff argue that the asserted claim of the '854 patent is invalid based on Minato (RX-0723). RIB at 52-54; SIB at 171-173; Tr. (Lebby) at 1246:6-13. Complainant only affirmatively disputes that Minato discloses "wherein the cathode and anode provide structural support to the transparent surface." CRB at 46-47; CPB at 324-326.[25]

For substantially the same reasons discussed *supra* part V.D.3, I find that Minato either anticipates, or alternatively renders obvious in combination with Uemura, claim 1 of the '854 patent.

5. Uemura (RX-0779)

Respondents and Staff argue that the asserted claim of the '854 patent is anticipated by Uemura (RX-0779) if the '854 patent claims are interpreted according to the Complainant. RIB 54-56; SIB at 173-174.

For substantially the same reasons discussed *supra* part V.D.5, I find that Uemura satisfies all of the non-disputed limitations. Tr. at 1239:11-23.

[25] Respondents' motion to strike Complainant's arguments concerning "III-nitride LED comprising a sapphire growth substrate" and "molding comprising a phosphor" limitations is granted. *See* Motion Docket No. 1220-047. Arguments that could have been timely raised in pre-hearing briefs but were not so raised are waived.

I find, however, that Uemura does not satisfy the sole disputed limitation, having a "molding configured to extract light from both a front side … and a back side." Unlike the '464 patent, which requires only that light in fact escape both sides and that there be a molding, Uemura's molding is not *configured* to extract light from both the front and back sides of the light emitting device. Though the molding may *permit* some light to escape from both sides, the shape of the molding is explicitly *configured* to extract light preferentially from the back side of the light emitting device. *See* RX-0779, FIG. 1, 3:8-13, 5:1-25.

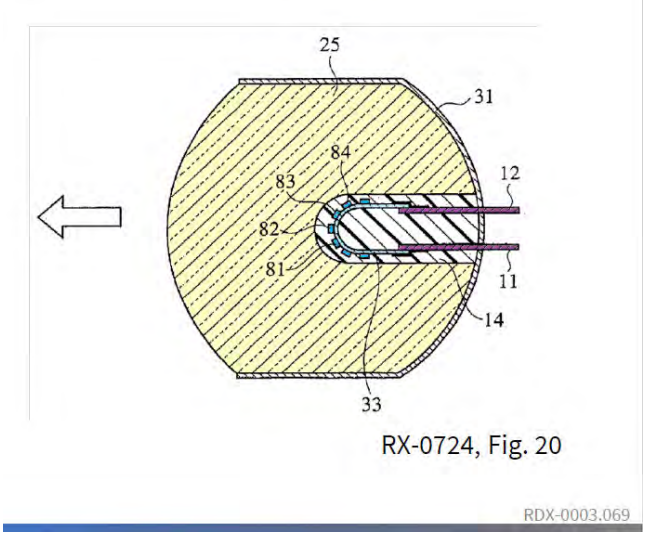
6. Tamaoki (RX-0724)

Asserted claim 1 of the '854 patent is invalid as anticipated by U.S. Patent No. 6,961,190 ("Tamaoki"). Respondents and Staff contend Tamaoki anticipates the '854 patent. RIB at 56-61; SIB at 171-176. For the reasons that follow, I agree.

a. Overview of Tamaoki

U.S. Patent No. 6,961,190 ("Tamaoki") was published on November 1, 2005, and it is undisputed that it is § 102(b) prior art to all the Asserted Patents.

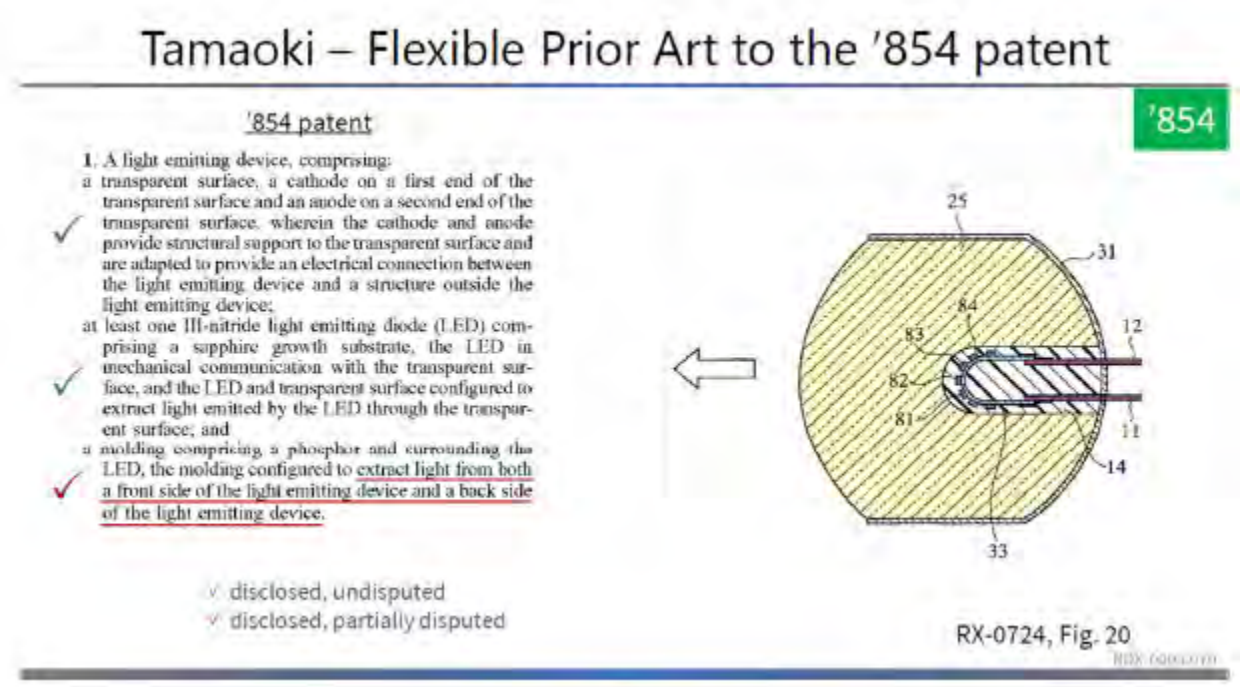
Tamaoki has GaN (III-nitride) LEDs 81, 82, 83, and 84 (green below) with a sapphire growth substrate. *See, e.g.*, RX-0724 at 24:45-48. Those LEDs are on a transparent surface 33 (blue), which is supported by a cathode and anode 11 and 12 (purple) on its opposing ends. RX-0724 at 25:35-36, 24:48-57, RDX-0003.069; Tr. 1260:22-1261:8. The LED chips mounted on the transparent film substrate are surrounded by a formed lens 25 (yellow) made of resin and optionally containing "luminescence material," which I find a person of ordinary skill would understand to include phosphor. *See* RX-0724 at 21:14-21; FIGS. 20, 22.



RDX-0003.069 (annotated version of Tamaoki Fig. 20). Tamaoki teaches that if the "film substrate" for the LEDs (33 in the above diagram) is "formed into the bullet-shaped, by transparent material, . . . luminescene from plural disc-shaped LEDs . . . propagates to the rea surface direction (in FIG. 20, to the right direction)." RX-0724 at 25:32-38.

b. Claim 1

Respondents and Staff contend Tamaoki anticipates the '854 patent. RIB at 56-61; SIB at 171-176. For the reasons that follow, I agree, and find that Tamaoki discloses all the elements of claim 1 of the '854 patent.

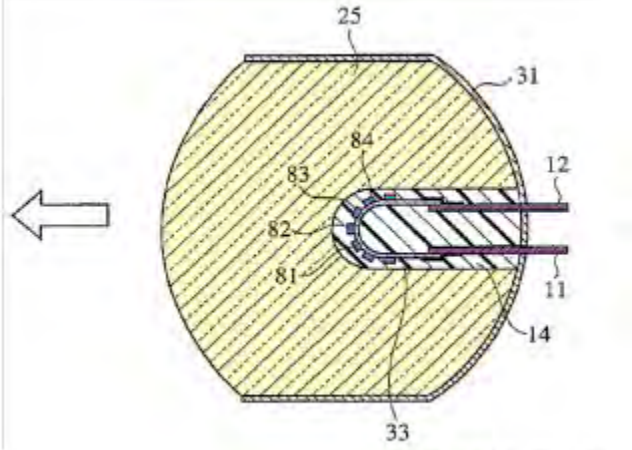


Complainant did not dispute that Tamaoki met all the limitations of claim 1 of the '854 patent except for the "extract light from both sides" limitation in its prehearing brief. CPB at 330-332.[26] Complainant argues only that Tamaoki's molding is not configured to extract light from both a front and back side of the LED. CRB at 47-52.

Tamaoki discloses an LED package with a dominant direction of light, shown below, a flexible, transparent submount to which LED chips 81, 82, 83, 84, are attached, and electric pins 11 and 12, which are similar to the through-pins discussed above with respect to Shimizu. Tr. (Lebby) at 1260:22-1261:8. The submount and LED chips are surrounded by a lens made of resin

[26] Respondents' motion to strike Complainant's argument concerning lack of disclosure of the word "phosphor" in Tamaoki is granted. *See* Motion Docket No. 1220-047. Complainant was aware of the content of Tamaoki at the time of the filing of its prehearing brief but did not dispute that Tamaoki teaches a phosphor at that time. Arguments not raised in the pre-hearing brief are waived.

and optionally containing luminescence material, RX-0724 at 21:14-18, 36:45-51, 62:28-33, which a person of ordinary skill would understand to be phosphor.



RX-0724, Fig. 20

RDX-0003.069.

Tamaoki is express that in certain embodiments, "outside geometry of bulk-shaped lens 20-29 are not always required to be optically flat, but also small irregularity can be implemented on the surface like a crystal glass." RX-0724 at 65:65-66:3. In such embodiments, "*the output lights emit in **all** directions.*" *Id.* at 66:1-2. Tamaoki thus explicitly discloses a molding configured to extract light from both the front and back sides (whatever those may be).

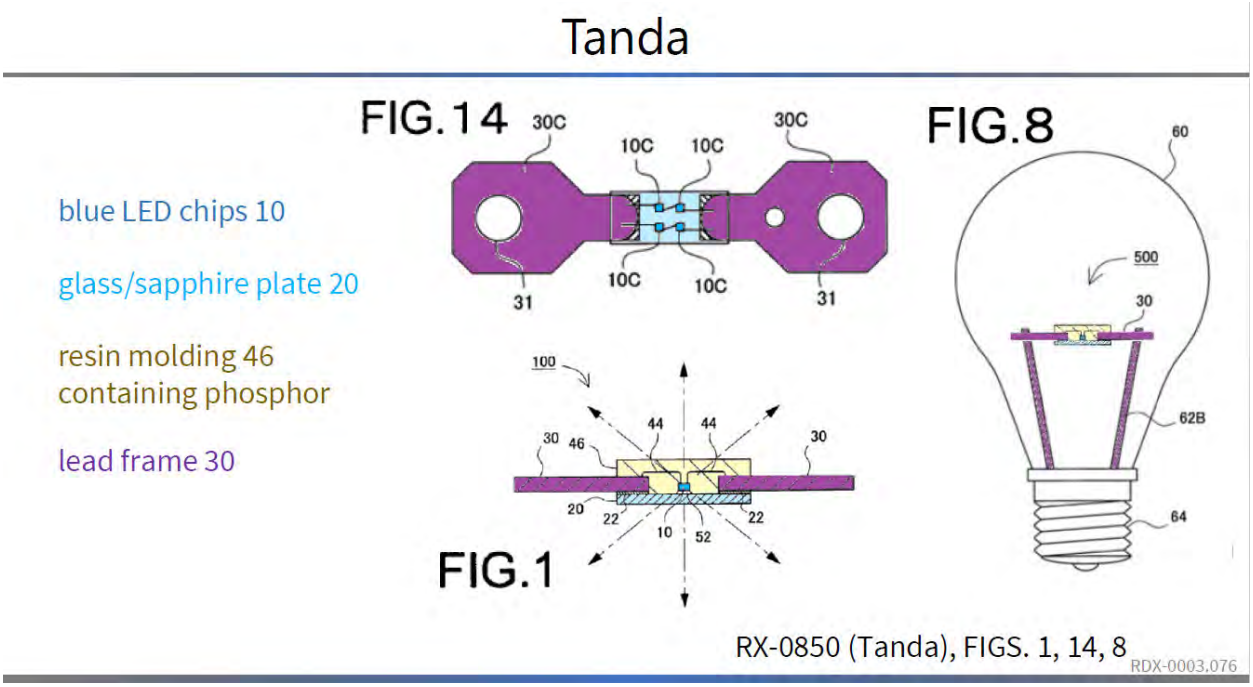
I find that Tamaoki anticipates claim 1 of the '854 patent.

7. Tanda (RX-0850)

Tanda was published on June 21, 2007 and is § 102(a), (b) and (e) prior art to the '854 patent only if Complainant is not entitled to claim priority to the '447 provisional. *See supra* part IV.D; RIB at 61.

Tanda describes an LED device that includes an LED, packaged on a transparent plate so that light is "uniformly radiate[d]…in all directions." RX-0850 at [0044]; *see also id.* at FIGS. 1, 4, 6, 8, 10, [0008], [0028]-[0029], [0042], [0044]-[0045], [0050]-[0051]; Tr. at 1268:11-1269:6.

It was designed "to provide a light emitting device that has high reliability and can provide broad light emission." RX-0850 at [0004]; RDX-0003.076; Tr. at 1268:11-1269:6.



RDX-0003.076.

Tanda's Figures 1, 8 and 14, annotated above, show a GaN LED chip 10 disposed on a "transparent board 20" by a die-bonding process. RX-0850 at [0044]; Tr. at 1268:11-1269:6. The "transparent board 20" can be made of sapphire. RX-0850 at [0029]; RDX-0003.075; Tr. at 1268:11-1269:6. Light is extracted from the front side of the blue LED by passing through "wavelength conversion member 50," and light is extracted from the back side by passing through the "transparent board 20." RX- 0850 at [0029], [0044]-[0046]; Tr. at 1268:11-1269:6.

Tanda's LED is electrically connected through wire lines 44 to metal plates 30, which connected to transparent board 20, and is then encased in transparent member 40 and/or wavelength converter 50. RX-0850 at [0043]; RDX-0003.075; Tr. at 1268:11-1269:6. Tanda discloses "transparent member 40," which "can be formed in any curved optical lens shape by transfer molding or the like." RX-0850 at [0044]; Tr. 1268:11-1269:6. These resin moldings are

"thermally curable epoxy" that "is molded through an arbitrary molding method." RX-0850 at [0028], [0029]; Tr. 1268:11-1269:6. Further, "a phosphor 48 can be mixed into an epoxy resin as the transparent member 40C so that the transparent member 40C serves as a wavelength conversion member." RX-0850 at [0047], Tr. 1268:11-1269:6. The wavelength conversion member 50 is a "resin film…containing a phosphor." RX-0850 at [0045]; Tr. at 1268:11-1269:6.

Tanda also discloses that its device can be packaged in a light bulb with the use of simple support leads. RX-0850, FIG. 8; RDX-0003.075; Tr. 1268:11-1269:6. In the figures above, Tanda also discloses that multiple LEDs can be used. RX-0850 at FIG. 14; *see also id.*, FIG. 16; RDX-0003.076; Tr. 1268:11-1269:6.

I find that Tanda teaches each element of claim 1 of the '854 patent. Because Tanda is not prior art, however, *see supra* part VII.D.2, I do not find that it invalidates the '854 patent.

VIII. THE '557 PATENT

A. Claim Construction

I construed the disputed terms "sapphire/sapphire plate/sapphire growth substrate," and "a molding" as part of the claim construction order issued as Order No. 39. *See* CC Order at 8–16. I hereby incorporate the discussion of those terms on pages 8-16 of Order No. 39 as part of this initial determination.

B. Infringement

For the reasons that follow, I find that Complainant has failed to demonstrate infringement of each of the asserted claims of the '557 patent by any Accused Products.

Complainant accuses all of the Accused Rigid Products of infringing claim 1 of the '557 patent.

1. Claim 1

I find that the Accused Rigid Products have not been shown to infringe claim 1 of the '557 patent.

a. "A light emitting device, comprising:"

The parties agreed that the preamble of claim 1 is not limiting. JX-0015 at 2. In light of the parties' agreement and the presumption that preambles are not limiting, I find that the preamble is not limiting.

b. "a sapphire plate"

Despite the parties' agreement that the Accused Rigid Products submounts are polycrystalline aluminum oxide, Complainant contends that they literally meet the "sapphire" limitation under my construction of that term. CIB at 105 (citing 626:24-627:19, 726:7-18; CX-0207 (FIGS. 45, 50-51); CX-2198.0012 ("in the polycrystal each grain is single-crystalline"); CDX-0002C.0043; Tr. (Eden) 1050:25-1051:2. Complainant's argument is inconsistent with the language of the claim. Their expert, Dr. Schubert, opined that, because the submounts "consist of" grains of single crystal aluminum oxide, they "include[] or comprise[] single crystal aluminum oxide." Tr. (Schubert) at 626:24-627:24. Relying on *Crystal Semiconductor Corp. v. TriTech Microelectronics Int'l, Inc*., 246 F.3d 1336, 1348 (Fed. Cir. 2001) for the proposition that the patent "transition 'comprising' creates a presumption that the recited elements are only a part of the device, that the claim does not exclude additional, unrecited elements," Complainant argues that "a light emitting device, comprising a sapphire plate" is equivalent to "a light emitting device comprising a plate comprising sapphire." This sort of sophistry has been rejected soundly and repeatedly by the Federal Circuit. *See Dippin' Dots, Inc. v. Mosey*, 476 F.3d 1337, 1343 (Fed. Cir. 2007) ("the term 'comprising' does not reach into each of the six steps to render every word and

phrase therein open-ended"); *Spectrum Intern., Inc. v. Sterilite Corp.*, 164 F.3d 1372, 1379–80 (Fed. Cir. 1998) ("'Comprising' is not a weasel word with which to abrogate claim limitations.").

Claim 1 of the '557 patent does not recite a plate "comprising sapphire" or a plate "including sapphire." Instead, the claim recites "***a*** sapphire plate." Thus, the claim is directed to "a sapphire plate," not a plate comprised of sapphire crystals. There is no indication that a single crystal aluminum oxide plate includes a plate containing grains of single crystal sapphire. Whether the grains in polycrystalline aluminum oxide are, in fact, considered to be "sapphire"—and there is good reason to doubt that—the ceramic submount/plate of the accused products is not itself "a" single crystal aluminum oxide plate.

For these reasons, I find that the Accused Rigid Products do not literally infringe this limitation. *See* Tr. (Eden) at 1025:12-1026:1 (Accused Rigid Products not sapphire).

i. Doctrine of Equivalents

For substantially the same reasons discussed *supra* part VII.B.1.b.iii with respect to the '854 patent, the Accused Rigid Products do not satisfy this limitation under the doctrine of equivalents.

Complainant contends that the Accused Rigid Products satisfy the "sapphire plate" limitation under the doctrine of equivalents. CIB at 107; Tr. (Schubert) at 628:1-8; *see also id.* at 726:8-18, 729:13-24. Put another way, Complainant argues that "a sapphire plate" is equivalent to "a plate composed of polycrystalline alumina." *But see* Tr. (Eden) at 1026:7-14 (testifying that the ceramic submounts are substantially different with respect to visual testing, transmission testing, SEM analysis, and integrating sphere testing from the claimed "sapphire" plates described in the patent).

Dr. Schubert provided the following function-way-result analysis:

- The purported function of the claimed sapphire plate is to structurally support the LEDs and extract light through the sapphire plate. Tr. (Schubert) at 628:9-15. Complainant contends the ceramic submount performs the same or substantially the same function by structurally supporting the LEDs and allowing light to be transmitted through. *Id.*
- The purported way the claimed sapphire plate performs its function is by providing a surface "that is sufficiently sturdy to support the LED die and is suitable for LED packaging." *Id*. at 628:16-22. Complainant contends the Accused Rigid Products' ceramic submounts perform the function in the same or substantially the same way. *Id*. at 628:23-629:2.
- Complainant contends the purported result of the claimed sapphire plate and the ceramic submount are the same or substantially the same: they result in a surface that structurally supports the LEDs and allows light to be extracted through the surface. *Id*. at 629:3-9.

CIB at 107.

For substantially the same reasons regarding "transparent," *supra* part V.B.1.iii.(b).(v), Complainant's doctrine of equivalents argument lacks sufficient support. Unlike Dr. Schubert's testimony, which was made without reference to the specification, Dr. Eden's testimony was persuasive and clearly tied to the teachings of the patent. *Id.* He provided a more appropriate function-way-result analysis, showing that the Accused Rigid Products do not satisfy this limitation under the doctrine of equivalents. Dr. Eden testified that the function of the sapphire plate is to effectively extract light, the way this function is performed is by the plate being a transparent material, and the result is the effective extraction of light. Tr. (Eden) at 1026:24-

1028:7. The Accused Rigid Products' plates have a comparatively poor ability to extract light and thus do not achieve or practice substantially the same function, in substantially the same way, to substantially achieve the same result. *Id*.

Additionally, I find that the term "sapphire plate" is inherently narrow, which limits the scope of its equivalents. *Moore USA Inc. v. Standard Register Co.*, 229 F.3d 1091, 1106 (Fed. Cir. 2000) ("If our case law on the doctrine of equivalents makes anything clear, it is that all claim limitations are not entitled to an equal scope of equivalents," including as a result of "the inherent narrowness of the claim language.") The Federal Circuit has explained that "for a patentee who has claimed an invention narrowly, there may not be infringement under the doctrine of equivalents in many cases, even though the patentee might have been able to claim more broadly." *Sage Prod., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1424 (Fed. Cir. 1997). Complainant chose to narrowly claim a "sapphire plate." It could have (and did in other patents) more broadly claimed this plate, or even could have claimed a different material, but chose not to. As a result, Complainant is not now allowed to extend the scope of "sapphire" to encompass a ceramic material, polycrystalline aluminum oxide, simply because it shares the same elemental composition.

I find that the sintered polycrystalline aluminum oxide plate in the Accused Rigid Products does not perform substantially the same function as the sapphire plate in the same way to achieve the same result because they do not effectively transmit light due in part to the presence of grains, pores, and grain boundaries, which absorb, reflect, and scatter light. *See* Tr. (Eden) at 992:16-995:6, 1000:13-25; RDX-0001.049, .057.

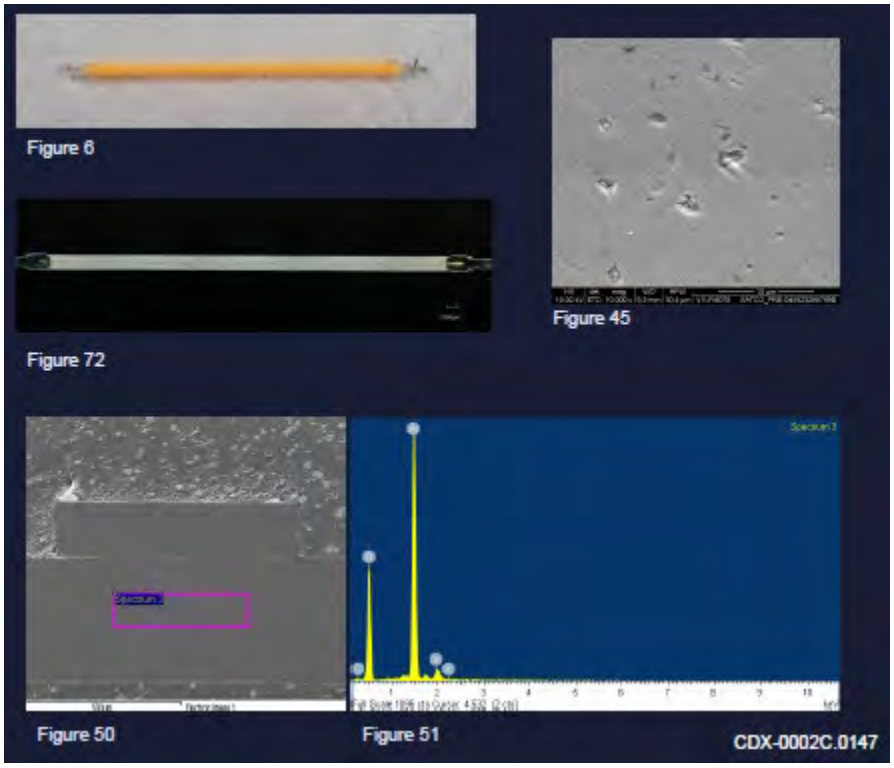
I therefore find that Accused Rigid Products do not satisfy the "sapphire plate" limitation under the doctrine of equivalents.[27]

c. "a cathode on a first end of the sapphire plate and an anode on a second end of the sapphire plate, wherein the cathode and the anode provide structural support to the sapphire plate and are adapted to provide an electrical connection between the light emitting device and a structure outside the light emitting device"

The Accused Products meet this limitation because they have electrodes on the left and right of the images below, one of which is a cathode and the other is an anode, each of which is positioned at the end of the transparent surface, and which are connected to the LED chips via bond wires.

I find that the Accused Rigid Products satisfy this limitation based on the photographs below which show the following: 1) a cathode on one end of the transparent plate and an anode on the other end; 2) the anode and cathode providing support to the transparent plate; and 3) the anode and cathode providing a connection to the structure outside of the filament LED. Tr. (Schubert) at 726:19-727:21, 729:25-730:23.

[27] Because Complainant's argument fails on the merits, I need not reach the question of estoppel raised in Respondents' motion for summary determination, Motion Docket No. 1220-027, which is denied as moot.



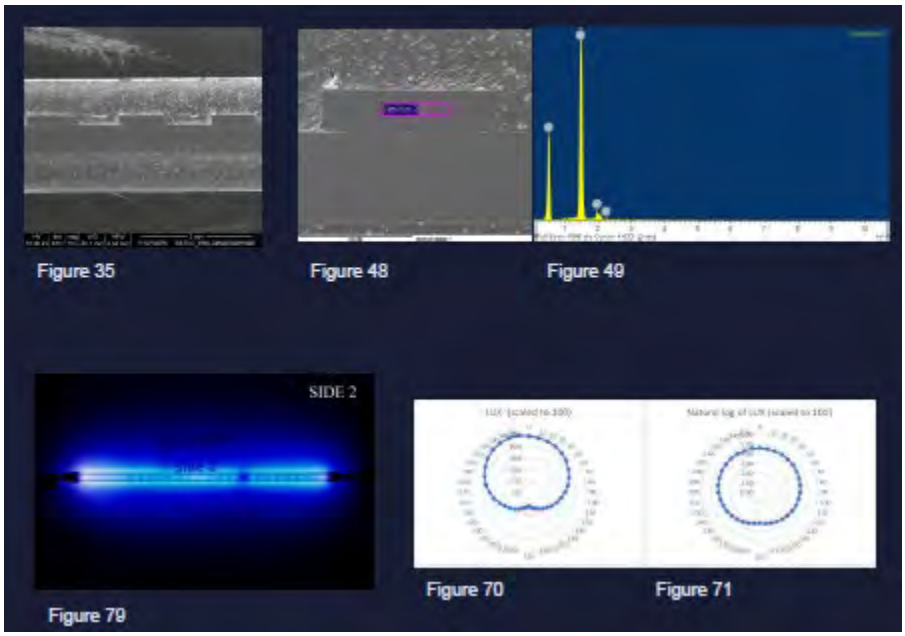
CDX-0002C.0147 (depicting Satco S29876); CDX-0002C.0148 (other Accused Products).

Respondents other than Feit do not dispute that their products satisfy this limitation, and Feit raises the same arguments it did with respect to claim 1 of the '854 patent. RRB at 116. I reject Feit's argument for the reasons stated in relation to that claim. *See supra* part VII.B.1. For the same reasons discussed *supra* part VII.B.1, I find that the Accused Rigid Products satisfy the "cathode on a first end" and "anode on a second end" limitations.

d. "a plurality of III-nitride light emitting diodes (LEDs), each comprising a sapphire growth substrate and each in mechanical communication with the sapphire plate, and the LEDs and sapphire plate configured to extract light emitted by the LED through the sapphire plate"

I find that the Accused Products satisfy this limitation as to "plurality of III-nitride light emitting diodes," "sapphire growth substrate," "mechanical communication" and "configured to extract light" limitations for substantially the same reasons discussed concerning claim 1 of the

'854 patent. *See supra* part VII.B.1.d. I likewise find the Accused Products do not satisfy the "sapphire plate" limitations" for the reasons discussed *supra* part f.C.1.b. *See* Tr. (Schubert) at 733:9-734:15, 735:3-736:16; *see also id*. at 634:25-635:11 (discussing sapphire growth substrate).



CDX-0002C.0153 (depicting Satco S29876); *see* CDX-0002C.0154 -.0156.

e. "and a molding comprising a phosphor and surrounding the LEDs, the molding configured to extract light from both a front side of the light emitting device and a back side of the light emitting device."

I find The Accused Rigid Products do not satisfy the "molding" limitation for the same reasons discussed *supra* part VII.B.1.e above. *See* Tr. (Eden) at 1024:14-21. I find that the Accused Rigid Products satisfy the "surrounding" limitation for the same reasons discussed in section VII.A.1.e.ii. *See* Tr. (Eden) at 1025:1-6.

C. Technical Prong of the Domestic Industry Requirement

Complainant only asserted that the Rigid Domestic Industry Products practice claim 1 of the '557 patent.

1. Claim 1

I find that the Rigid Domestic Industry Products do not practice claim 1 of the '557 Patent.

a. "A light emitting device, comprising"

The preamble is not limiting. *See supra* part VIII.B.1.a.

b. "a sapphire plate"

The Ceramic Domestic Industry Products do not practice this limitation. Dr. Schubert testified that the Rigid Domestic Industry Products practice this limitation "due to the similarity of the products and for the reasons I discussed earlier." Tr. (Schubert) at 731:1-8.

Dr. Schubert also testified that the same analysis with respect to literal infringement and the doctrine of equivalents applies to the Rigid Domestic Industry Products. *Id*. at 732:3-8.

For substantially the reasons discussed above I find that the Ceramic Domestic Industry Products do not practice this limitation literally or under the doctrine of equivalents, but the Acclaim Domestic Industry Product does. *See supra* parts VII.C.1.a.ii (Rigid Domestic Industry Products lack a molding, and Rigid Domestic Industry Products other than Acclaim Domestic

Industry Products have not been shown to be transparent) and VIII.B.1.b (polycrystalline alumina plates do not meet sapphire plate limitation).

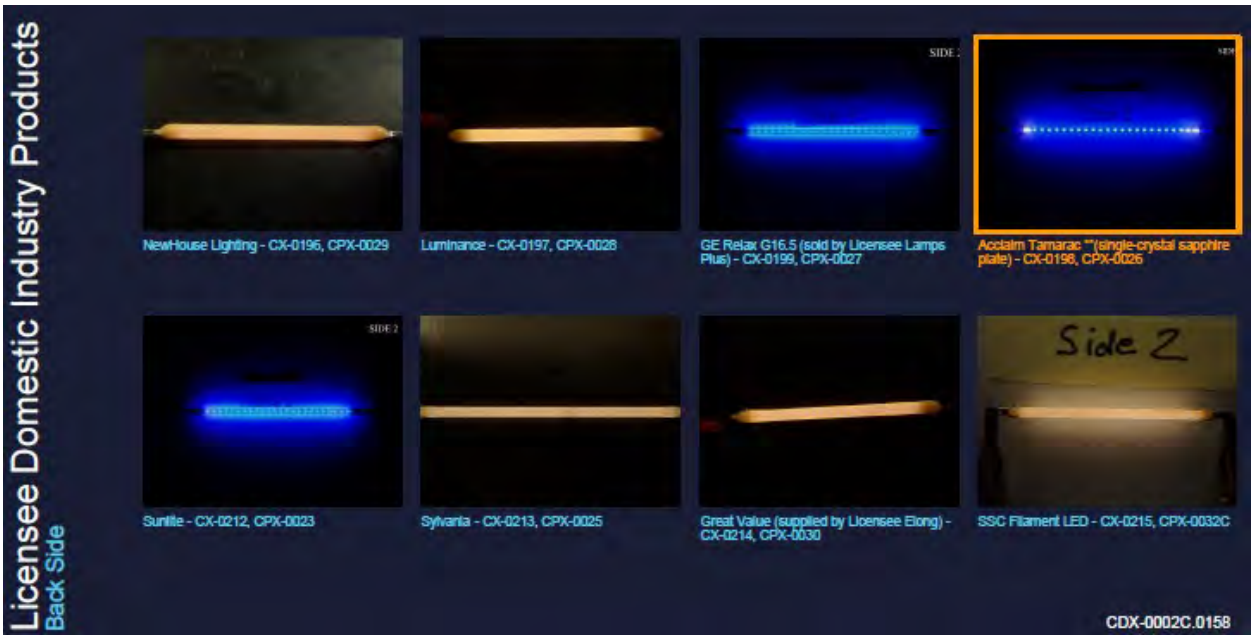
c. "a cathode on a first end of the sapphire plate and an anode on a second end of the sapphire plate, wherein the cathode and anode provide structural support to the sapphire plate and are adapted to provide an electrical connection between the light emitting device and a structure outside the light emitting device;"

The Rigid Domestic Industry Products practice this limitation. Dr. Schubert testified that the Rigid Domestic Industry Products practice this claim limitation due to the similarity of the products and for the same reasons he provided earlier. Tr. (Schubert) at 732:9-733:7. Respondents do not dispute that the Rigid Domestic Industry Products practice this limitation.

For substantially the reasons discussed above, I find that the Rigid Domestic Industry Products practice this limitation. *See supra* part VII.C.1.a.iii (Rigid Domestic Industry Products meet cathode/anode limitation).

d. "a plurality of III-nitride light emitting diodes (LEDs), each comprising a sapphire growth substrate and each in mechanical communication with the sapphire plate, and the LEDs and sapphire plate configured to extract light emitted by the LEDs through the sapphire plate;"

Dr. Schubert testified that the Rigid Domestic Industry Products practice this claim limitation based on the reasons provided earlier and due to the similarity of the products. Tr. (Schubert) at 737:3-738:5.



Respondents dispute whether the Ceramic Domestic Industry Products are "configured to extract light emitted by the LED through the transparent surface." RIB at 117. I find that the Rigid Domestic Industry Products practice the "configured to extract light" limitation for substantially the same reasons discussed in above with respect to the Accused Products. *See supra* part VII.B.1.d.

I further find that the Ceramic Domestic Industry Products do not practice the "sapphire" limitation literally or under the doctrine of equivalents. *Id.* at VIII.B.1.b. Respondents do not dispute that the Acclaim Domestic Industry Product, which includes a sapphire plate, practices this limitation. RIB at 117. I find that the Acclaim Domestic Industry Product practices this limitation for substantially the reasons discussed *supra* part VII.B.1.d (Acclaim Domestic Industry Product is configured to extract light from both sides); *see* CX-0198 (Scanning Electron Microscope imaging and X-ray spectroscopy confirming single crystal sapphire substrate).

e. "and a molding comprising a phosphor and surrounding the LEDs, the molding configured to extract light from both a front side of the light emitting device and a back side of the light emitting device."

The Rigid Domestic Industry Products do not satisfy this limitation. Dr. Schubert testified that the Rigid Domestic Industry Products practice this limitation due to the similarity of the products and for the reasons discussed earlier. Tr. (Schubert) at 743:4-744:16; CDX-0002C.0165-.0169.

Respondents assert that the Rigid Domestic Industry Products do not satisfy the "molding" limitation for the same reasons the Accused Products do not satisfy the limitation. RRB at 117.

For substantially the reasons discussed *supra* part VIII.B.1.e, I find that the Rigid Domestic Industry Products do not meet the molding limitation.

D. Validity

Respondents contend claim 1 of the '557 patent is anticipated by each of the Yamazaki, Minato, Okamoto, and Uemura references.[28] Alternatively, Respondents contend claim 1 of the '557 patent is rendered obvious by combinations of each of their presented primary purportedly anticipatory references with other, secondary references addressed below.

1. Written Description

Respondents argue that the '557 patent and the priority documents for the '557 patent lack written description support for the cathode/anode limitation for the same reasons discussed with respect to the written description of the '854 patent, *supra* part VII.D.1. For the same reasons discussed in part VII.D.1, I find that the '557 patent and its priority document have sufficient written description support.

Respondents also argue that the '557 patent lacks written description support for "a plurality of III-nitride light emitting diodes (LEDs)." RIB at 69-70. To that point, Dr. Lebby testified that neither the specification nor the figures in the '557 patent show a plurality of LEDs. Tr. (Lebby) at 1270:20-1271:15. Complainant does not dispute that there is no express disclosure of a plurality of LEDs; instead, they argue that the number of LEDs on a device would be a design choice, a point Dr. Lebby himself admitted. CRB at 59-60; Tr. (Lebby) at 1230:20-1231:2; Tr. (Schubert Reb.) 1340:20-23. Complainant's response to this is unavailing: while it might be true that using multiple LEDs would be *obvious*, *see* Tr. (Lebby) at 1271:18-1272:4, a "description which renders obvious a claimed invention is not sufficient to satisfy the written description

[28] On November 8, 2021, the PTAB issued a discretionary denial of a petition for *inter partes* review filed by Satco that relied on some of the same references. EDIS Doc. ID at 756192 (citing IPR2021-00661). Among other factors, the board relied on the imminence of determination in this investigation to deny review. *See id.* at 29.

requirement of that invention." *Regents of the Univ. of Cal. v. Eli Lilly & Co.*, 119 F.3d 1559, 1567 (Fed. Cir. 1997) (citations omitted).

Complainant also relies, however, on Fig. 25A of U.S. Patent No. 7,781,789 (the "'789 patent"), which the '557 patent incorporates by reference, and which indisputably discloses a plurality of LEDs. CRB at 60-61; Tr. (Lebby) 1288:17-21 (admitting FIG. 25A of the '789 patent discloses a plurality of LEDs).

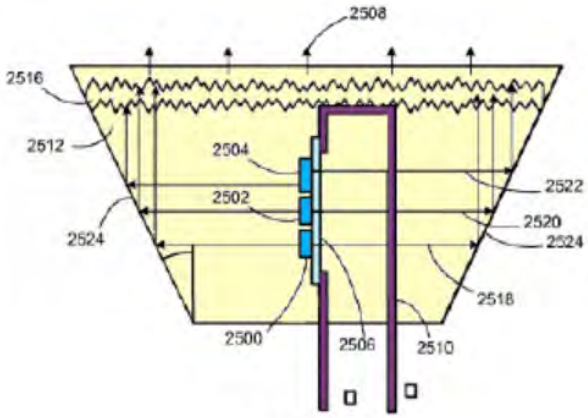


FIG. 25A

CX-0488

37 C.F.R. § 1.57(b)-(c) expressly allow for such incorporation by reference, even of essential materials, when the document being incorporated is a patent. *See* 37 C.F.R. § 1.57(d). The '557 patent expressly incorporates the '789 patent by reference. JX-0005 at 7:10-21, 8:4-5. Respondents do not address this argument. RIB at 69-70. I find that the '557 patent has adequate written description support for the plurality of LED limitation as incorporated by reference from the '789 patent.

Thus, I find that that the '557 patent has adequate written description support.

2. Priority Date

I find that the '557 patent is entitled to its claimed priority date for the same reasons discussed with respect to the '854 patent, *see supra* part IX.D.2.

3. Yamazaki (RX-0828)

Respondents and Staff argue that the asserted claim of the '557 patent is rendered obvious by Yamazaki for largely the same reasons discussed with respect to claim 1 of the '557 patent, with the sole difference being the '557 patent's requirement of a "plurality" of LEDs as compared to the '854's requirement only of "at least one" LED. RIB at 66; SIB at 204..

Complainant only disputes that Yamazaki discloses "wherein the cathode and anode provide structural support to the transparent surface" and a "plurality of LEDs." CRB at 58.

I find that, for the reasons below, Yamazaki renders claim 1 of the '557 patent obvious, either alone or in combination with Minato.

a. "wherein the cathode and anode provide structural support to the sapphire plate"

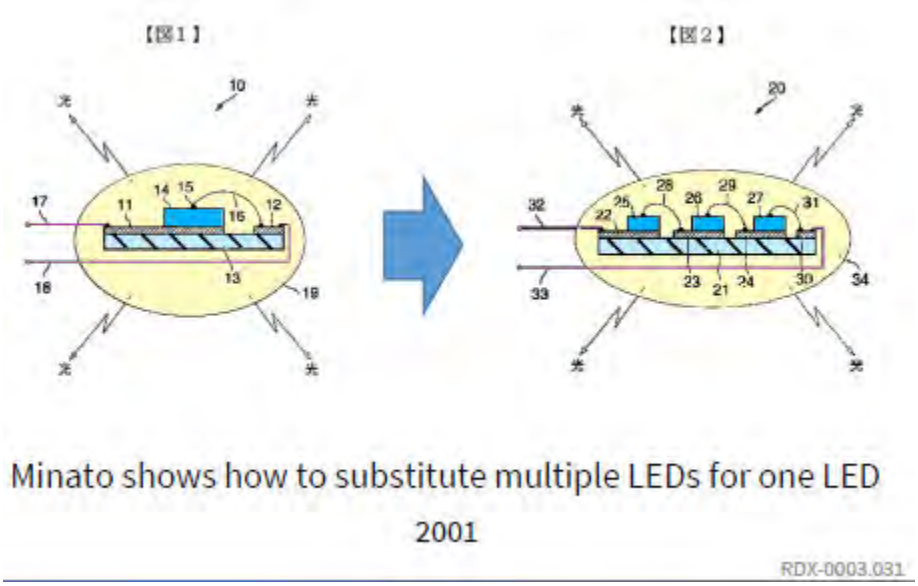
Respondents' invalidity arguments with respect to this limitation are the same as those raised with respect to the "anode/cathode" limitation in claim 1 of the '854 patent. *See* RIB at 66. Complainant agrees the issues are identical. *See* CRB at 58.

For the reasons discussed concerning that limitation, *supra* part VII.D.3, I find that Yamazaki discloses or renders obvious this limitation.

b. "plurality of LEDs"

Respondents argue that it would be obvious to modify Yamazaki to meet the "plurality of LEDs" limitation. RIB at 67-69. To that end, Dr. Lebby testified that adding another LED to increase the brightness of the LED package would be simple for a person of ordinary skill. *Id*. at 1229:22-1230:4.

Additionally, Minato shows how to add an LED chip to a package only containing one LED, as shown by the two figures below. *Id*. at 1230:5-19.



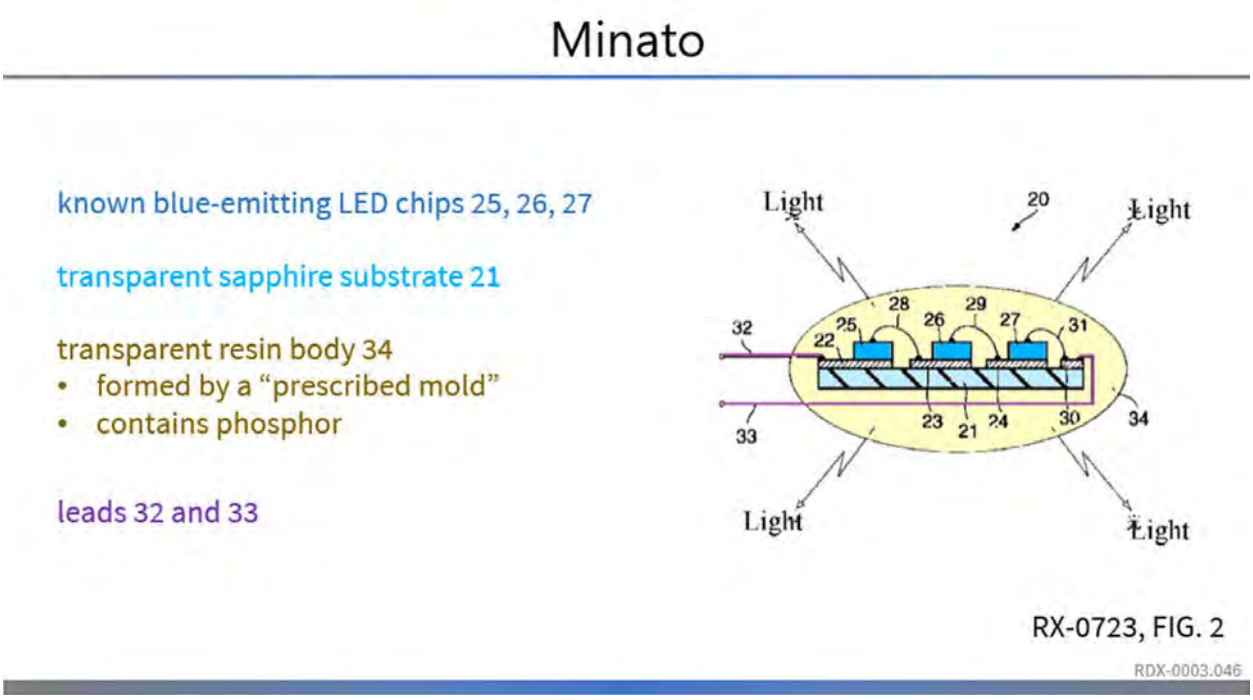
RDX-0003.031. Dr. Lebby testified that modifying Yamazaki to contain multiple LEDs would not require changing any components' functionality and would be a "simple design choice" for a person of ordinary skill. Tr. (Lebby) at 1230:20-1231:2. The predictable result would be an increase in the amount of light. *Id*. at 1231:3-13; *see KSR* at 421 (rearranging known elements in known configurations for known results constitutes an obvious design choice)

Complainant argues only that Yamazaki does not disclose a plurality of LEDs, but does not specifically dispute that such a modification would be obvious. Indeed, they explicitly argue that "a [person of ordinary skill] would understand selecting the number of LEDs in a given package" is a "simple design choice." CRB at 60.

I find that Yamazaki, either alone or in combination with Minato, renders obvious the plurality of LEDs limitation. Accordingly, I find that claim 1 of the '557 is invalid as obvious in light of Yamazaki, either alone or in combination with Minato.

4. Minato (RX-0723)

Respondents and Staff argue that claim 1 of the '557 patent is either anticipated or rendered obvious by Minato for the same reasons discussed with respect to claim 1 of the '854 patent. RIB at 66; SIB at 206. Complainant only disputes that Minato discloses "wherein the cathode and anode provide structural support to the transparent surface." *Id*. at 67; CRB at 59. As shown in the figure below, there can be no dispute that Minato discloses a plurality of LEDs. *See* RX-0723, FIG. 2. For the reasons discussed above concerning claim 1 of the '854 patent, *supra* part VII.D.4, I find that Minato either anticipates, or renders obvious in view of Uemura or Shimizu, claim 1 of the '557 patent.

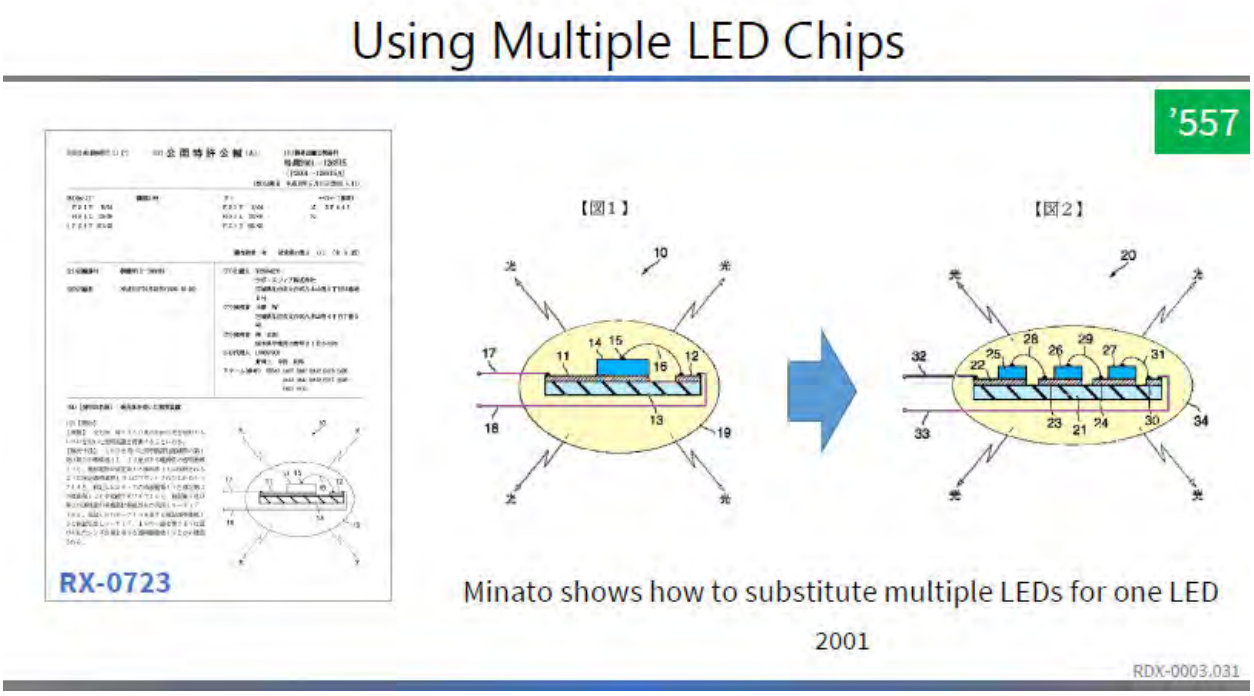


RDX-0003.046.

5. Uemura (RX-0779)

Respondents and Staff argue that claim 1 of the ’557 patent is invalid in light of Uemura for the same reasons discussed with respect to the ’854 patent. RIB at 67-69; SIB at 206; Tr. (Lebby) at 1239:9-1241:0.

As with Yamazaki, *supra* part VIII.D.3, Uemura does not disclose a plurality of LEDs. RIB at 67. [29] But as with Yamazaki, it would have been obvious to modify Uemura to include a plurality of LEDs for the same reasons discussed above. *See supra* part VIII.D.3.



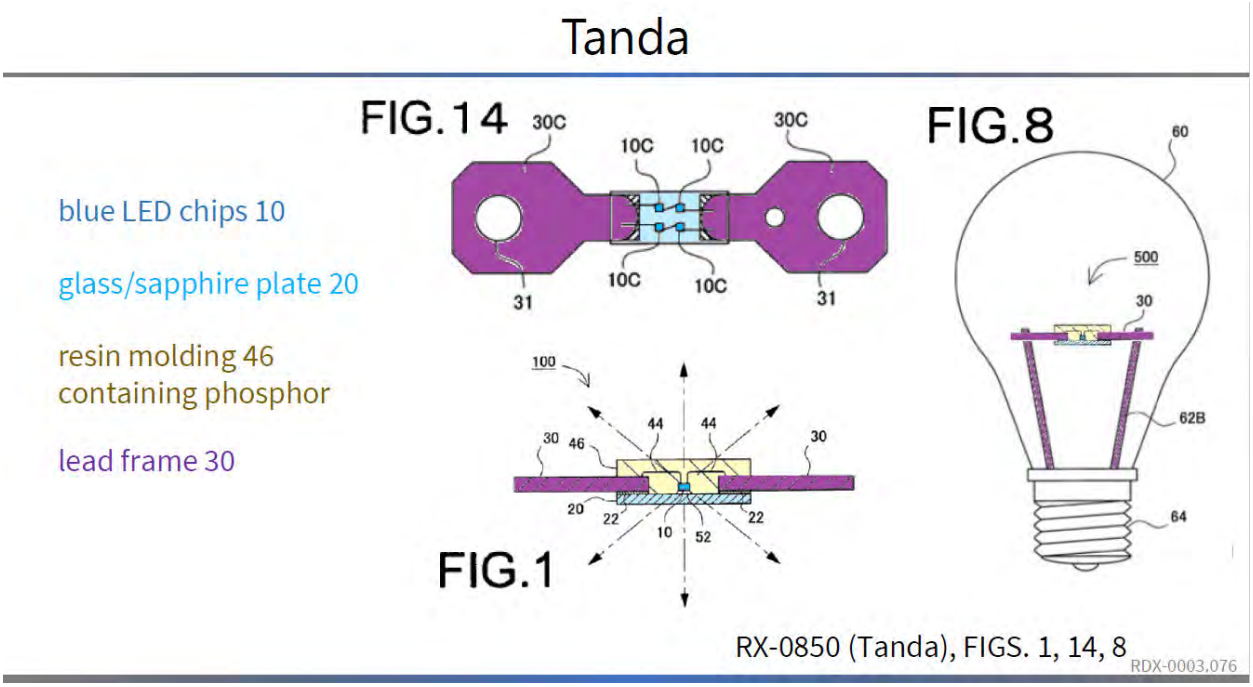
RDX-0003.031.

For those reasons, I find that Uemura renders claim 1 of the ’557 patent obvious, either alone or in combination with Minato.

[29] Respondents’ motion to strike Complainant’s argument concerning lack of disclosure of a “plurality of III-nitride light emitting diodes” is granted. *See* Motion Docket No. 1220-047. Complainant was aware of the content of Uemura at the time of the filing of its prehearing brief but did not dispute that Uemura teaches that limitation at that time. Arguments not raised in the pre-hearing brief are waived.

6. Tanda (RX-0850)

I find that Tanda satisfies all of the limitations of claim 1 of the '557 patent for substantially the same reasons discussed above concerning the '854 patent. *See supra* part VII.D.7. As shown below, Tanda teaches the use of a sapphire plate and a plurality of III-nitride light emitting diodes.



RDX-0003.076 (citing RX-0850 (Tanda), FIGS. 1, 14, and 18).

However, Tanda is only prior art if the '557 patents is not entitled to its priority dates. Because the '557 patent is entitled to its priority date, *see supra* part VIII.D.2, Tanda is not prior art and cannot invalidate claim 1 of the '557 patent.

IX. PUBLIC TRUST (FEIT)

Feit argues that Complainant's assertions against Feit are barred because Feit is a California corporation,[30] and the University of California constitutes a public trust administered by Complainant for the benefit of California corporate citizens like Feit. RIB at 75.

Feit's argument appears novel: it has presented no evidence or legal authority that Complainant's status as a public trust renders the Asserted Patents unenforceable against California entities. The only cases cited—one from 137 years ago—pertain to substantially different resources, such as riparian rights. *See People v. Davis*, 3 Cal. App. 5th 708, 713-14, 208 Cal. Rptr. 3d 39, 43 (Ct. App. 2016).

Based on this case law, it appears the public trust doctrine narrowly encompasses authority and control over the state's navigable waters and underlying lands, as well as wildlife and natural resources. *See Nat'l Audubon Soc'y v. Superior Court*, 33 Cal. 3d 419, 425, 658 P.2d 709, 712 (1983); *Ctr. for Biological Diversity, Inc. v. FPL Grp., Inc.*, 166 Cal. App. 4th 1349, 1363, 83 Cal. Rptr. 3d 588, 599 (2008), *as modified on denial of reh'g*, (Oct. 9, 2008). Feit has not identified any authority holding that IP rights are subject to the public trust doctrine in any jurisdiction, let alone in California. Such a holding would be contrary to the body of the common law to date, as courts have held California residents liable for infringing patent rights held by the University of California. *See, e.g., Regents of Univ. of Cal. v. Actagro*, CVF 02-6530 AWI DLB, 2003 U.S. Dist. LEXIS 29275 (E.D. Cal. Jan. 13, 2003); *Regents of Univ. of Cal. v. Hansen*, No. CIV S98-0715 WBS PAN, 1999 WL 33268423, at *11 (E.D. Cal. Nov. 8, 1999).

I reject Feit's defense based on the public trust doctrine.

[30] Complainant contends that Feit has presented no evidence of its status as a California corporation, CRB at 66, but Complainant admitted that status in its complaint and exhibits thereto. *See* Compl. ¶ 27 and Ex. 10.

X. PATENT EXHAUSION (IKEA)

Seoul Semiconductor ("SSC") holds a license to the Asserted Patents, and thus products containing filament LEDs supplied by SSC have never been accused in this investigation. CX-0712C; RX-0074C; Complaint (EDIS Doc. ID 718435) ¶89. IKEA argues that a "majority" of its imported Accused Products utilize licensed filament LEDs from SSC. RIB at 75-77. Thus, the burden rests on IKEA to prove the license defense. *See Certain Digital Video Receivers & Hardware & Software,* Inv. No. 337-TA-1001, Comm'n Op. at 11 (Dec. 6, 2017).

IKEA relies on CX-0920C, a spreadsheet provided by its supplier, Keetat, to determine the source of filament LEDs in its Accused Products. Tr. (Rodin) at 903:16-904:3, 908:7-909:4. Mr. Rodin testified that IKEA relies on this spreadsheet *and* the date stamp applied to the products by Keetat to determine which products contain SSC filament LEDs. *Id.* at 904:20-905:1, 912:15-23, 912:25-913:20. According to Mr. Rodin, adjacent the date stamp on each bulb, Keetat marks products containing [redacted] filament LEDs with an "O" stamp. *Id. at* 908:11-909:8, 911:16-912:23; CPX-0020.0004.

IKEA's claim that it only imports products with licensed SSC filaments is contradicted by other record evidence. For example, IKEA does not dispute that Accused Product 104.501.82 was stamped by Keetat with an "O" (indicating [redacted] filament LEDs) and a date stamp that, according to Keetat's spreadsheet at CX-0920C, indicates this same product contains *SSC* filament LEDs.

	A	B	C	D	E	F
1	IKEA Article Number	Type Number	Production date	Date stamp	Apply qty	LED Manufacturer
471	10450182	LED1806G2	3/29/2019	201913	883	SSC Filament
472	10450182	LED1806G2	3/29/2019	201913	2,301	SSC Filament
473	10450182	LED1806G2	3/29/2019	201913	16	SSC Filament

Tr. (Rodin) at 911:16-914:9; CPX-0020.0004; CX-0920C.

IKEA suggests that "only one bulb" with markings that conflict with the Keetat tracking document does not undermine the credibility of Keetat's documentation and stamping system. RIB at 75-76. But the inference IKEA asks me to draw—that a production line made only a *single* erroneously marked bulb—strains credulity. IKEA presents no evidence supporting this inference other than Mr. Rodin's belief that the marking was erroneous. IKEA also argues that because the stamp on the bulb indicating filament manufacturer is not required by IKEA it is somehow less reliable than the date stamp and documentation that IKEA *does* require. RIB at 76; Tr. (Rodin) 909:9-910:15. But IKEA does not explain why Keetat's internal controls for its own benefit would be any less accurate than those for the benefit of its customers.

The mostly likely inference to be drawn from the record evidence as a whole is that IKEA has imported bulbs with unlicensed [redacted] filaments. I therefore find that IKEA has not met its

burden that all of its Accused Products are licensed. Accordingly, IKEA's patent exhaustion defense fails.

XI. DOMESTIC INDUSTRY

For a patent-based complaint, a violation of section 337 can be found "only if an industry in the United States, relating to the articles protected by the patent . . . exists or is in the process of being established." 19 U.S.C. § 1337(a)(2). The complainant bears the burden of establishing that the domestic industry requirement is satisfied. *John Mezzalingua Assocs., Inc. v. Int'l Trade Comm'n*, 660 F.3d 1322, 1331 (Fed. Cir. 2011). The domestic industry requirement of section 337 is often described as having an economic prong and a technical prong. *InterDigital Commc'ns, LLC v. Int'l Trade Comm'n*, 707 F.3d 1295, 1298 (Fed. Cir. 2013); *Certain Stringed Musical Instruments and Components Thereof*, Inv. No. 337-TA-586, Comm'n Op. at 12–14, USITC Pub. No. 4120 (Dec. 2009). "The technical prong concerns whether complainant practices at least one claim of the asserted patents. The economic prong concerns domestic activities with respect to the patent or patented article." *Certain Printing and Imaging Devices and Components Thereof*, Inv. No. 337-TA-690, Comm'n Op. at 25, USITC Pub. No. 4289 (Nov. 2011) ("*Certain Printing and Imaging Devices*").

Section 337(a)(3) sets forth the following economic criteria for determining whether the economic prong of the domestic industry requirement is satisfied in such investigations:

> [A]n industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned –
>
> (A) significant investment in plant and equipment;
>
> (B) significant employment of labor or capital; or
>
> (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3). Given that these criteria are listed in the disjunctive, satisfaction of any one of them will be sufficient to meet the economic prong of the domestic industry requirement. *See Certain Printing and Imaging Devices*, Comm'n Op. at 26.

A. Effect of Invalidity Determinations

Because I find that the claims of the '529, '464, '854, and '557 patents that Complainant relies upon for its technical prong showing are invalid, *see, e.g., supra* parts V.D ('529 patent), VI.D ('464 patent), VII.D ('854 patent), VIII.D ('557 patent), I find that the alleged '529, '464, '854, and '557 domestic industry products are not protected by their respective patents. *See Certain Child Carriers and Components Thereof, and Products Containing the Same*, Inv. No. 337-TA-1154, Final IDRD (April 7, 2020) (EDIS Doc. ID 707158) at 172 ("Because I find the patents are invalid and unenforceable, the patents protect no articles and . . . cannot satisfy the domestic industry requirement"), *not reviewed in pertinent part*, 85 Fed. Reg. 29484 (May. 15, 2020) (EDIS Doc. ID 710444 85). As a result, I find that Complainant cannot satisfy the domestic industry requirement.

I have further determined, as an alternative holding, that if the relevant claims of the '529, '464, '854, and '557 patents were not invalid, Complainant would satisfy the technical prong of the domestic industry requirement with respect to those patents, as addressed above, *supra* parts VI.C, VII.C, VIII.C, and IX.C.

Below I provide findings concerning the economic prong of the domestic industry requirement in the event that the relevant patent claims are not invalid and are practiced by Complainant or by an authorized article.

B. Economic Prong of the Domestic Industry Requirement

Complainant claims the following expenditures demonstrate a domestic industry in articles protected by the Asserted Patents:

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Total
SSLEEC Labor	$1,126,130	$1,103,749	$1,097,943	$1,150,842	$1,004,777	**$5,483,442**
SSLEEC Plant & Equipment	$ 416,566	$ 260,152	$ 372,039	$ 411,274	$ 392,790	**$1,852,822**
Total SSLEEC R&D	$1,542,697	$1,363,901	$1,469,983	$1,562,116	$1,397,568	**$7,336,264**

CIB at 114.

For the reasons that follow, I find that Complainant satisfies the economic prong of the domestic industry requirement.

1. Findings of Fact Relating to the Domestic Industry

The findings of fact below concern the economic prong of the domestic industry requirement.

a. Engineering, Research, and Development at SSCLEEC

Complainant operates the Solid State Lighting & Energy Electronics Center ("SSLEEC") at University of California Santa Barbara ("UCSB"). SSLEEC is a research institute "that is funded primarily by industrial contributions from member companies." Tr. (DenBaars) at 105:2-8. SSLEEC's "main research focus" is making highly efficient LED lighting. *Id*. SSLEEC is the only research center of its kind focused on improving light efficiency technology through transparent LED technology. *Id*. at 105:9-15; Tr. (Schubert) 599:4-9. The research leading to the technology disclosed in the Asserted Patents occured at SSLEEC, and SSLEEC continues to use that technology today. Tr. (DenBaars) at 137:5-15.

SSLEEC employees include highly skilled faculty, Ph.D. students, researchers visiting from industry member companies, and development engineers. Tr. (DenBaars) at 137:18-139:6. Professor Steven DenBaars, with Professors Shuji Nakamura, Jim Speck, and Umesh Mishra, are

primarily responsible for overseeing SSLEEC's research and providing strategic direction. *Id*. 138:11-139:2. Students and visiting researchers perform most of SSLEEC's ER&D activities related to transparent LED technology. *Id*. 137:18-138:10.

SSLEEC makes hundreds of LEDs in the course of its research into transparent substrates, lead frames, phosphors, and light extraction. CX-2214; Tr. (DenBaars) at 108:14-109:6, 137:5-15, 201:7-16; *id*. (Englander) at 403:18-22. As Professor DenBaars testified, SSLEEC's LED research includes three subjects involved in the production of the transparent filament LEDs: epitaxial growth, chip fabrication, and transparent packaging. *Id*. 108:6-13, 113:5-25. It takes six hours to grow an LED by epitaxial growth, another month to fabricate it, and then another week to package it. *Id*. at 116:23-25. Each of these activities is described below.

i. Epitaxial Growth

Epitaxial growth in the context of this investigation refers to depositing gallium and nitrogen atom on crystalline substrates to "grow" LED chips and other components. Tr. (DenBaars) at 115:18-116:25. SSLEEC's epitaxial growth research is aimed at making LEDs with layers that are more transparent and more efficient. Tr. (DenBaars) at 115:18-116:25, 121:9-122:8; Tr. (Englander) 401:23-402:3. For example, SSLEEC's epitaxial growth research develops quantum wells and tunnel junctions that allow more light to escape from a transparent LED. Tr. (DenBaars) at 117:1-121:8; CX-1297.002, CX-1301.002, CX-1340.004, CX-1352.004, CX-1365.003, CX-1389.002.

Improvements in epitaxial and bulk crystal growth discovered at SSLEEC have resulted in the development of brighter LEDs with less efficiency droop and that require less heat sinking. Tr. (DenBaars) at 115:15-116:25. This in turn encourages the use of lead frames with a transparent plate instead of conventional packaging because transparently packaged devices are less likely to

fail from overheating. *Id*. 123:11-124:21, 129:11-130:14, 135:19-136:7. *Id*. 121:9-122:3; 123:11-124:2.

ii. Chip Fabrication

SSLEEC's chip fabrication research involves research into transparent materials and films that improve light extraction from the chip and improve the chip's efficiency. Tr. (DenBaars) at 124:3-21, 129:11-130:14; CX-1328.002, CX-1369.001-.002, CX-1428.005, CX-1346.004, CX-1406.003, CX-1359.004, CX-1438.005. SSLEEC's improvements in chip fabrication would not result in more efficient light extraction without placing the fabricated chips in transparent packaging. Tr. (DenBaars) at 129:11-130:14.

iii. LED Transparent Packaging

SSLEEC's LED packaging research involves experiments with different transparent substrates, different phosphors, and different molding to produce more efficient LEDs. Tr. (DenBaars) at 130:15-136:7. Transparent LED technology has been a major area of research at SSLEEC for the last 20 years. *Id*. at 107:13-108:13, 109:12-111:4; Tr. (Wong) at 323:1-324:11. SSLEEC publications demonstrate SSLEEC's continued use of transparent packaging to achieve SSLEEC's best LED results. Tr. (DenBaars) at 137:5-15; CX-1485.001, CX-1337.001-.002, CX-1377.008, CX-1531.003, CX-2208.002.

b. Licensing Infrastructure

UCSB also has an Office of Technology and Industry Alliances ("TIA"). Tr. (Englander) at 384:1-5. TIA manages intellectual property development and licensing. *Id*. at 384:6-21. Specifically, TIA's main responsibilities are (1) managing the intellectual property developed through UCSB research, including licensing, and (2) managing UCSB's agreements with industry partners. RX-0073 at ¶ 3.

c. Facilities and Equipment

SSLEEC occupies four buildings on UCSB's campus where it performs the research described above related to the patented technology: Engineering II, Engineering Science Building ("ESB"), Materials Research Lab ("MRL"), and Elings Hall. Tr. (DenBaars) at 143:15-23; Tr. (Owens) at 358:21-359:2. In addition to those buildings, SSLEEC acquired a 1,000 square-foot lab in Henley Hall to expand its transparent packaging lab. Tr. (DenBaars) 143:15-23; Tr. (Owens) 359:3-8, 367:20-368:1; CX-0585. Each of these facilities is discussed below.

i. Engineering II

The Engineering II building at UCSB is SSLEEC's headquarters and houses SSLEEC faculty and staff, most offices, conference room space, and epitaxial growth labs containing seven metal organic chemical vapor deposition (MOCVD) machines. Tr. (DenBaars) at 144:1-145:12; CX-0759.007-.0012; CX-0513; CX-0515; CX-0522-0524. SSLEEC uses the Engineering II building and equipment contained there for research related to the technology in the Asserted Patents and to create SSLEEC Domestic Industry Products. Tr. (DenBaars) at 145:13-146:9; CX-0448; Tr. (Owens) at 371:1-372:3 (SSLEEC purchases the equipment and residual value vests with SSLEEC). For example, the MOCVD machines are used to perform epitaxial growth and put down transparent layers to create LEDs used in the SSLEEC Domestic Industry Products. Tr. (DenBaars) at 144:11-15; CX-0759.007, .012, .013, .014, .029, CX-0515.

ii. Engineering Science Building

The Engineering Science Building houses the nanofabrication facility (clean room) and LED transparent packaging labs where researchers perform LED chip fabrication, extraction, transparent packaging, and measuring and testing of gallium nitride-based LEDs. Tr. (DenBaars) 146:10-149:10; CX-0759, CX-0503-512, CX-0514; CX-0519. SSLEEC uses the Engineering Science Building and equipment contained there for research related to the technology described

in the Asserted Patents and to create SSLEEC Domestic Industry Products. Tr. (DenBaars) 148:25-149:10; CX-0448; CX-0525 (nanofabrication tool list).

By way of illustration, SSLEEC's nanofabrication lab is used to put down metal contacts, leads, and structures on top of LEDs, and researchers clean and dice those LEDs for use in the SSLEEC Domestic Industry Products. Tr. (DenBaars) at 146:10-149:10. This facility also contains photolithography bays where researchers write contact pads and metallization with a mask aligner. *Id*.; CX-0759.017, .019, .021, .025, and .027. Other activities in this facility include E-Beam metal deposition, reactive ion etching, and oxide chemical vapor deposition. *See* CX-0525.001-.003. The nanofabrication lab has a vacuum oven, residual gas analyzer, UV ozone reactor, chemical-mechanical polisher, tube furnace, dicing saw, optical microscopes, and other equipment. *See id*. SSLEEC is charged a recharge rate for use of this equipment. Tr. (DenBaars) at 148:16-24.

The Engineering Science Building also houses the packaging lab, which includes an integrating sphere for measuring light output and an atomic layer deposition tool to make transparent side walls. CX-0514; Tr. (DenBaars) at 146:24-147:7, 148:18-149:10. The Engineering Science Building packaging and characterization laboratory contains equipment necessary to dice, grind, fabricate, and wire bond LED structures and encapsulate them in epoxy and silicones with phosphors. CX-0525.001-.003. The same laboratory has equipment for testing the electrical and optical spectral characteristics of LEDs. *See id*.

iii. Materials Research Lab and Elings Hall

The Materials Research Lab houses material for preparation of phosphors and oxides and characterization equipment used for creation of phosphors. SSLEEC uses the Materials Research Lab and equipment contained there for research related to the Asserted Patent and to create SSLEEC Domestic Industry Products. Tr. (DenBaars) at 149:11-150:6. The Materials Research

Lab has a centering furnace used to center phosphors and spectrometer used to measure their optical properties. *See* CX-0520, CX-0521.

Elings Hall houses microscope and characterization tools to analyze LED structures, such as a double crystal x-ray machine to analyze crystal quality of the layers, atomic force microscopes, atom probe microscope, transmission electron microscopes (TEM), scanning electronc miscroscopes (SEM), and secondary ion mass spectroscopy (SIMS). Tr. (DenBaars) at 150:9-20; CX-0516; CX-0517.

2. Plant and Equipment

Complainant alleges that from FY2016 through FY2020, domestic plant and equipment investments related to the SSLEEC Domestic Industry Products practicing the ’529 and ’464 patents totaled $1,852,822. Tr. (Thomas) at 460:4-11, 481:22-23, 482:11-13; CDX-0001C.0009.

a. SSLEEC’s Plant and Equipment Investments

SSLEEC separates its plant and equipment into office space expenses, lab space expenses, and laboratory and equipment expenses. Tr. (Thomas) at 466:24-467:10, 476:4-8. Facility expenses include maintenance, utilities, repairs, insurance, and depreciation, as well as modifications or updates to preexisting facilities specific to SSLEEC’s requirements. Tr. (Owens) at 359:12-16, 367:6-368:1. Equipment expenses include equipment costs and lab recharge rates. *Id.* at 368:19-371:6. Complainant’s economic expert, Mr. Thomas, calculated SSLEEC’s plant and equipment expenditures related to the SSLEEC Domestic Industry Products that practice the ’464 and ’529 patents and described his results at the hearing, summarized as follows:

Plant & Equipment ’529 & ’464 Patents Total (FY 2016 – FY 2020)	
Office	
Maintenance & utilities (Office)	$81,216
Building Depreciation (Office)	$88,597
Lab	
Maintenance & Utilities (Lab)	$120,516
Building Depreciation (Lab)	$128,078
Equipment and Lab Expenditures	$1,434,415
Total	**$1,852,822**

Tr. (Thomas) at 460:4-11; CDX-0001C.0009.

Mr. Thomas provided comprehensive details on how he calculated each of these totals, including his method of allocating costs to the ’529 and ’464 patents. CIB at 132-140. For Office expenses, Mr. Thomas relied on the testimony of Ms. Owens, an employee of Complainant, to calculate costs for office space and lab space used by SSLEEC in total, and then further allocated those calculated costs based on Dr. DenBaars’ estimates of the percentage of SSLEEC labor hours incurred related to the ’529 and ’464 patents, excluding visiting researchers. Tr. (Thomas) at 467:3-470:3, 473:13-475:15; Tr. (Owens) at 368:2-18; CX-0244; CX-0245.

For laboratory expenditures, Mr. Thomas calculated the costs of SSLEEC’s lab space in the same manner as he did for office space, utilizing standard depreciation, utility, and maintenance metrics. Mr. Thomas then allocated those costs based on Dr. DenBaars’ estimation that at least 40% of the lab costs were attributable to research related to the technology in the ’529 and ’464 patents and SSLEEC Domestic Industry Products practicing those patents. Tr. (Thomas) at 480:1-16; CX-0244; CX-0245. Dr. DenBaar’s proportional assessment was based on his personal experience overseeing SSLEEC and extensive review of SSLEEC’s publications during the

relevant period. Tr (DenBaars) at 101:8-23; 139:15-143:12 (spent "hundreds and hundreds of hours poring through" SSLEEC's research output to come to allocation percentage), 153:6-154:23 (estimating 40% of lab costs are attributable to the patented technology), 205:10-16. For equipment, Mr. Thomas relied on Ms. Owens' methodology for calculating SSLEEC's equipment expenses, laboratory fees and recharge rate expenses. Tr. (Owens) at 369:2-371:6; Tr. (Thomas) at 478:14-479:25. Mr. Thomas then allocated those costs using Dr. DenBaars' estimate of time used related to the SSLEEC Domestic Industry Products that practice the '529 and '464 patents. Tr. (Thomas) at 480:1-4; CX-0247; CX-0248; CX-0254; CX-0256; CX-0477–CX-0484; CX-0755; CX-0756.

I find that these allocations and cost estimates are reasonable. Mr. Thomas calculated these expenses based on reliable inputs with conservative methodology. Respondents and Staff criticize these calculations, contending that they include expenses tied to articles that have not been shown to practice the Asserted Patents and that the claimed expenses were related to the technology in the Asserted Patents generally, rather than to particular products. RRB at 118-121, SIB at 229-231. But as I address below, *infra* part XI.B.5, Respondents' and Staff's criticisms do not overcome Dr. DenBaars' credible testimony that provides the basis for Mr. Thomas' calculations, and Respondents and Staff provide no substantive criticism of the methodology beyond that foundational attack.

I find that Complainant has demonstrated $1,822,822 in plant and equipment expenses with respect to articles protected by the '529 and '464 patents.

b. SSLEEC's Plant and Equipment Investments Are Significant

I find that Complainant's investments in plant and equipment are significant under 19 U.SC. § 1337(a)(3)(A).

To establish a domestic industry, a complainant need not eclipse some "minimum monetary expenditure." *Certain Stringed Musical Instruments*, Inv. No. 337-TA-586, Comm'n Op. at 25-26 (May 16, 2008). Nor does a complainant need "to define the industry itself in absolute mathematical terms." *Id*. A complainant need only establish that its activities are significant by showing how those activities are important to the articles protected by the patent in the context of the company's operations, the marketplace, or the industry in question. *See Certain Printing and Imaging Devices and Components Thereof*, Inv. No. 337-TA-690, Comm'n Op. at 27-30 (February 17, 2011); *Certain Male Prophylactic Devices*, Inv. No. 337-TA-546, Comm'n Op. at 39 (August 1, 2007). This substantiality must be demonstrated both qualitatively and quantitatively. *Lelo v. Int'l Trade Comm'n*, 786 F.3d 879, 885 (Fed. Cir. 2015).

All of Complainant's claimed plant and equipment expenses are for facilities in the United States used to make articles protected by the '529 and '464 patents. Tr. (Thomas) at 483:17-20, 485:1-21; Tr. (DenBaars) at 104:2-22; Tr. (Owens) at 357:19-24. When domestic industry products are both "developed in the United States and . . . made in the United States," the result is "a 'value added' ratio of nearly 100%." *Certain Wearable Monitoring Devices*, Inv. No. 337-TA-1190, Order No. 34 at 31 (Oct. 1. 2020), *affirmed in pertinent part*, Comm'n Op. at 39 (May 5, 2021) (EDIS Doc. ID 741594). In such circumstances, the investment is qualitatively significant.

Respondents and Staff criticize the various comparisons Complainant provided to demonstrate the substantiality of its industry. *Compare* RRB at 123-124, SIB at 229-232; Tr. (Bakewell) at 1320:13-25, 1321:2-13 *with* CIB at 144. These critiques lack merit, as discussed below.

First, Respondents argue "Complainant's comparison of SSLEEC to itself is improper." RRB at123. That phraseology ignores both the substance of Complainant's comparisons and

Commission precedent. When Complainant compared SSLEEC's investments in plant and equipment "to itself," it compared investments directed to articles practicing the '529 and '464 patents to SSLEEC's total plant and equipment investments, among other comparisons. CIB at 147-148. The record evidence shows that from FY2016 through FY2020 an average of 36.2% of SSLEEC's total plant and equipment investments related to the SSLEEC Domestic Industry Products that practice the '529 and '464 patents, and that is significant. Tr. (Thomas) 484:5-25; CDX-0001C.0028. The Commission has often found significance based on such comparisons. *See, e.g., Certain Pocket Lighters*, 337-TA-1142, Comm'n Op. at 11-13 (June 22, 2020) (EDIS Doc. ID 714450) (affirming finding of significance under sub-prongs (A) and (B) based on percentage of domestic activities devoted to protected articles as compared to overall operations); *Certain Toner Cartridges*, 337-TA-1174, Initial Determination at 117-118 (July 23, 2020) (EDIS Doc. ID 716848) (finding domestic investments significant by comparing those investments to total domestic investments), *not reviewed*, Notice of Comm'n Det. Not To Review a Final Initial Determination (EDIS Doc. ID 719096).

Next, Respondents contend Complainant should have compared SSLEEC's investments to expenditures of other university research institutions. RRB at 123-124. The Commission has never stated a *per se* requirement that a complainant's domestic industry investments must be compared to outlays of other industry participants. Indeed, the Commission has found a significant domestic industry in many investigations without consideration of other players in the market beyond the complainant. *See, e.g.*, *Certain Pocket Lighters*, 337-TA-1142, Comm'n Op. at 11-13.

Finally, Respondents assert Complainant put forward "inconsistent" opinions from multiple experts and therefore those opinions are "unreliable." RRB at 124. Respondents mischaracterize the record in making the argument. Mr. Thomas did not testify, as Respondents

state in their brief, that Dr. Seth's comparison of "licensing revenue from the filament LED portfolio containing the Asserted Patents with licensing revenue from all of UCSB" "wouldn't be a relevant comparison." *Id*. (citing Tr. 490:15-23). Rather, Mr. Thomas quite reasonably testified that "comparing SSLEEC's activities and expenses to the entire UC Santa Barbara campus," including "for example, athletics," would not meaningfully inform the significance of SSLEEC's investments relating to the patented technology. Tr. 490:15-23.

Complainant put forward credible evidence that the $1,852,8221 it invested in plant and equipment constituted an average of 36.2% of its total expenses for plant and equipment during that time period. Tr. (Thomas) at 484:5-25; CDX-0001C.0028. These facilities and machines were necessary to produce the SSLEEC Domestic Industry Products protected by the '529 and '464 patents. I find that this investment is significant in the context of SSLEEC's operations, both quantitatively and qualitatively. *See* Tr. (Thomas) at 484:5-25.

3. Labor and Capital

Complainant alleges that from FY2016 through FY2020, labor expenditures related to the SSLEEC Domestic Industry Products practicing the '529 and '464 patents totaled $5,483,442. Tr. (Thomas) at 461:22-462: 24, 481:20-22, 482:11-13.

a. SSLEEC's Labor and Capital Investments

SSLEEC claims a total of $5,483,442 in labor expenses from 2016 to 2020. Tr. (Thomas) at 462:25-465:5; CDX-0007.; CDX-0001C.0009. Mr. Thomas calculated SSLEEC's labor investments related to the SSLEEC Domestic Industry Products that practice the '529 and '464 patents by gathering payroll and benefits information for SSLEEC employees maintained in the ordinary course of business and allocating labor expenditures based on time spent on ER&D activities attributable to the technology in the Asserted Patents, relying on the knowledge of Dr. DenBaars for that allocation. Tr. (Thomas) at 460:4-11, 461:22-462:15, 463:5-24, 464:18-465:4;

Tr. (Owens) at 357:2-5, 360:25-361:5, 372:4-11.7; Tr. (DenBaars) at 139:7-14; CX-0148–CX-0153; CX-0243; CX-0251; CX-243; CX-0249–CX-0251; CX-0751–CX-0754. Dr. DenBaars made those determinations based on his personal knowledge and review of the academic papers produced by SSLEEC during that period, which he testified were the best record of how SSLEEC researchers spent their time. Tr. (DenBaars) at 101:8-23, 139:15-143:12, 205:10-16; CX-2079 (DenBaars time estimates). Based on these inputs, Mr. Thomas calculated the relevant labor expenditures as follows:

	FY 2016	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Total**
SSLEEC Labor, ’529 & ’464 Patents	$1,126,130	$1,103,749	$1,097,943	$1,150,842	$1,004,777	**$5,483,442**
Total SSLEEC ER&D Labor	$5,869,665	$6,142,184	$6,149,429	$6,332,135	$5,426,245	**$29,919,659**
% of Total ER&D Labor	19.2%	18.0%	17.9%	18.2%	18.5%	**18.3%**

CDX-0001C.0027 (citing CX-0148-0153, -251, -243, -249, -250, -751-754, and -2079); Tr. (Thomas) at 482:21-483:16 (calculation was deliberately conservative), 483:21-484:4 (same); *see also* CX-0537-CX-0544; CX-0736-CX-0740; *see also* Tr. (Thomas) at 460:4-11 (presenting alternative calculation of 26%); CDX-0001C.0009. This calculation excludes the productivity of visiting researchers, who are not paid a salary from SSLEEC. *See* Tr. (Owens) at 377:24-378:2; Tr. (Thomas) at 465:19-466:8.

I find that these allocations and cost estimates are reasonable given the facts of this investigation. Mr. Thomas calculated these expenses based on reliable inputs with conservative methodology. Respondents and Staff criticize these calculations, contending that they include expenses tied to articles that have not been shown to practice the Asserted Patents and that the claimed expenses were related to the technology in the Asserted Patents generally, rather than to

particular products. RRB at 124-126 (criticizing allocation as overinclusive), 126 (criticizing allocation for same reasons discussed concerning subprong (A)), SIB at 232 (incorporating arguments concerning subprong (A)). But as I address below, *infra* part XI.B.5, Respondents' and Staff's criticisms do not overcome Dr. DenBaars' credible testimony that provides the basis for Mr. Thomas' calculations, and Respondents and Staff provide no substantive criticism of the methodology beyond that foundational attack.

Respondents specifically challenge the inclusion of labor costs for researchers they contend "did no work related to the SSLEEC [Domestic Industry] Products or even transparent packaging." RRB at 125 (citing Tr. (Speck) 289:14-294:24). This argument mischaracterizes the record. The very passage of testimony that Respondents cite for this argument, Tr. 289:14-294:24, demonstrates just the opposite. Professor Speck, who has personal knowledge from his work at SSLEEC, testified Dr. Alhassan, Dr. Li, Dr. Almogbel, and Dr. Young worked on epitaxial growth. Tr. (Speck) 289:14-294:24. Professor Speck also testified Dr. Wu researches transmission electromicroscopy techniques for imaging microstructures. *Id*. Drs. DenBaars and Speck explained at length how epitaxy research and characterization of structures through microscopy relate to the patented technology. Tr. (DenBaars) at 107:13-108:13, 109:12-111:4, 115:15-116:25, 117:1-121:8, 121:9-122:3, 123:11-125:21, 129:11-130:14, 135:19-136:7, 137:5-15, 150:7-151:1, 201:7-16; *id.* (Speck) at 295:8-14, 297:1-18. Complainant provided credible evidence that all of the labor included in the relevant total was for an industry "relat[ed] to the articles protected by the patent[s]" in question. *See* 19 U.S.C. § 1337(a)(2).

I find that Complainant has demonstrated $5,483,442 in labor expenses with respect to articles protected by the '529 and '464 patents.

b. SSLEEC's Labor and Capital Investments Are Significant

I find that Complainant's investments in labor and capital are significant under 19 U.S.C. § 1337(a)(1)(B).

All of Complainant's claimed labor and capital expenses occur in the United States at SSLEEC, which makes articles protected by the '529 and '464 patents. Tr. (Thomas) at 483:17-20, 485:1-21; Tr. (DenBaars) at 104:2-22; Tr. (Owens) at 357:19-24. When domestic industry products are both "developed in the United States and . . . made in the United States," the result is "a 'value added' ratio of nearly 100%." *Certain Wearable Monitoring Devices*, Inv. No. 337-TA-1190, Order No. 34 at 31 (Oct. 1. 2020), *affirmed in pertinent part*, Comm'n Op. at 39 (May 5, 2021) (EDIS Doc. ID 741594). In such circumstances, the investment is qualitatively significant.

Moreover, Complainant's investments in labor and capital are significant when compared to SSLEEC's total labor expenses. From FY2016 through FY2020, Mr. Thomas conservatively calculated that an average of 18.3% of SSLEEC's total labor expenses related to the SSLEEC Domestic Industry Products protected by the '529 and '464 patents. Tr. (Thomas) at 482:21-483:16; CDX-0001C.0027. Viewed another way, 21% of SSLEEC's full-time employee equivalents were dedicated to transparent LED research related to the'529 and '464 patents from FY2016 through FY2020. Tr. (Thomas) at 485:22-486:24; CDX-0001C.0030. I find that this labor and capital investment of $5,483,442 is significant in the context of SSLEEC's operations, both quantitatively and qualitatively. *See* Tr. (Thomas) at 484:5-25.

Respondents and Staff invoke the same arguments criticizing Complainant's showing of significance under sub-prong (B) as they did for sub-prong (A). RRB at 127, SIB at 232. For the same reasons discussed above, *supra* part XI.B.2.b, I reject those challenges.

I find Complainant's labor and capital investment of $5,483,442 in articles protected by the '529 and '464 patent is significant in the context of SSLEEC's operations, both quantitatively and qualitatively. *See* Tr. (Thomas) at 484:5-25.

4. Engineering, Research and Development, and Licensing

Complainant relies on investments in engineering, research, and development ("ER&D"), along with investments associated with licensing efforts, to show a domestic industry exists with respect to all four Asserted Patents under 19 U.S.C. § 1337(C). Tr. (Thomas) at 519:25-520:12 (investments from prongs A & B), 494:1-4 (investments in licensing). The total amount Complainant claims for ER&D and licensing from FY2016 through FY2020 is $7,336,264. Tr. (Thomas) at 485:11-18.

Under sub-prong (C) of the statute, "the Commission requires that the complainant establish a nexus between the asserted patent and the U.S. investment in its exploitation." *Certain Integrated Circuit Chips & Prod. Containing the Same* ("*Integrated Circuit Chips"*), Inv. No. 337-TA-859, Comm'n Op. at 38, USITC Pub. No. 4849 (Nov. 2018).

a. ER&D Investments in the SSLEEC Domestic Industry Products

Complainant argues that there is a direct nexus between SSLEEC's ER&D activities and the Asserted Patents, relying on the testimony of Dr. DenBaars and numerous publications from SSLEEC. CIB at 142-143. Dr. DenBaars testified that SSLEEC's ER&D activities are documented by its peer-reviewed publications and the presentations that are given at its annual conference. Tr. (DenBaars) at 114:1-10. According to Dr. DenBaars, roughly 40% of SSLEEC's papers "directly relate to the success and the implementation of transparent LED technology." *Id.* at 114:21-115:4; *see also* Tr. (DenBaars) 115:5-14, 206:5-10, CX-2045 (summary of SSLEEC publications since 2005). As discussed in more detail below, SSLEEC's research into epitaxial

growth, chip fabrication, and transparent packaging exploits the Asserted Patents. Tr. (DenBaars) at 108:6-13.

i. Epitaxial Growth

Dr. DenBaars testified that researchers at SSLEEC develop quantum wells in epitaxially grown layers that are more transparent and let more light escape from an LED. *Id*. at 116:3-8. Dr. DenBaars also testified that SSLEEC worked on the following: changing the orientation of the crystal to semi-polar orientation, tunnel junction technology, light extraction by patterning sapphire growth substrates, and improving efficiency. *Id*. at 116:9-17, 116:18-25. As Dr. DenBaars testified, all of these areas of research help further the patented technology. *See id.* at 136:8-23.

Dr. DenBaars also discussed papers that relate to SSLEEC's work on epitaxial growth. Tr. (DenBaars) at 117:1-121:8, CX-1297, CX-1301, CX-1340, CX-1352, CX-1365, CX-1389. According to Dr. DenBaars, this research relates to the Asserted Patents because it is directed to layers that are more efficient and more transparent. *Id*. at 121:9-122:8. Further, he testified that there would not have been such "large improvements" in epitaxial growth without the inventions claimed in the Asserted Patents. *Id*. at 123:23-124:2.

Although SSLEEC's epitaxy research has led to other patents beyond the Asserted Patents at issue here, *see* Tr. (Speck) at 277:23-278:7, that does not negate the fact that the research exploits the patented technology. Research can, and often does, touch on more than one invention. *See Certain Microlithographic Machines,* Inv. No. 337-TA-468, ID at 365 (Jan. 29, 2003) ("particular R&D projects can contribute to the development of multiple models, and therefore, when looking at any one model, it is appropriate to count the full amount of R&D expenditures that contributed to the development of that model."), *not reviewed*, EDIS Doc. ID 179530. Technologies that enable the practice of a claimed invention, even if not specifically covered by a claim in an asserted

patent, can still be related to and exploit the patented technology. *Integrated Circuit Chips*, Inv. No. 337-TA-859, Comm'n Op. at 25 (Aug. 22, 2014) (a domestic industry under sub-prong (C) does not freeze at the point at which the patented technology is reduced to practice).

I find that Complainant has demonstrated a nexus between the claimed research in epitaxial growth and exploitation of the patented technology.

ii. Chip Fabrication

Dr. DenBaars also testified that SSLEEC's chip fabrication research improves the light extraction efficiency of the chip, which gets a "better boost" when combined with transparent packaging. Tr. (DenBaars) at 124:3-21, 129:11-20. As with epitaxial growth, Dr. DenBaars discussed publications describing SSLEEC research related to chip fabrication. Tr. (DenBaars) at 124:22-129:10, CX-1328, CX-1346, CX-1359, CX-1369, CX-1406, CX-1428, CX-1438.

Dr. DenBaars testified that he could not divide the research on chip fabrication between the two Asserted Patent case numbers because the research contributes "to the efficiency improvements and transparency improvements equally in the [A]sserted [P]atents." *Id*. at 129:21-130:1. Dr. DenBaars also testified that the improvements in chip fabrication discussed above would not be possible without the inventions disclosed in the Asserted Patents because the LED chip has to be put in a transparent package to see the improvement. *Id*. at 130:2-10. He further concluded that the improvements in light extraction and roughening would also not be possible without the inventions disclosed in the Asserted Patents. *Id*. at 130:11-14.

As with epitaxial growth, I find that Complainant has demonstrated a nexus between the claimed research in chip fabrication and exploitation of the patented technology.

iii. Transparent Packaging

Dr. DenBaars also discussed publications relating to SSLEEC's research in transparent packaging. Tr. (DenBaars) at 130:15-135:18, CX-1485, CX-1337, CX-1377, CX-1531, CX-2208.

Dr. DenBaars testified that transparent packaging research is aimed at packaging that provides light in 360-degrees and that improves light extraction using a roughened transparent plate. Tr. (DenBaars) at 135:19-136:7.

Although Dr. Lebby testified that one of the papers Dr. DenBaars highlighted, CX-1377, is about technology incompatible with the Asserted Patents, Tr. (Lebby) at 1280:9-1281:13, Dr. DenBaars' testimony about the transparent packaging research conducted at SSLEEC was still, as a whole, credible and reliable with respect to the connection between SSLEEC's research into transparent packaging and the Asserted Patents. *See, e.g.*, XI.B.1.

I find that Complainant has demonstrated a nexus between the claimed research in transparent packing and exploitation of the patented technology.

iv. Nexus Between Research, Products, and the Asserted Patents

Where the research and development efforts in articles that practice the asserted patents are "inextricably linked" to the asserted patents themselves, the nexus required by sub-prong (C) may be inferred. *Integrated Circuit Chips*, Inv. No. 337-TA-859, Comm'n Op. at 25. As found above in part XI.B.1.a, SSLEEC's research into epitaxial growth, chip fabrication, and transparent packaging relates to articles protected by the Asserted Patents. Tr. (DenBaars) at 108:6-13. Dr. DenBaars testified that SSLEEC's improvements in epitaxial growth, chip fabrication, and transparent packaging have advanced the entire filament LED industry. Tr. (DenBaars) at 136:8-23. Further, Dr. DenBaars testified that SSLEEC continues its research efforts related to transparent LED technology and that all of SSLEEC's best LED results are in transparent LED packages. Tr. (DenBaars) at 137:5-15.

Investments in research are not always easily traceable to specific engineering feats or particular products. *See Certain Microlithographic Machines*, Inv. No. 337-TA-468, ID at 365

(Jan. 29, 2003) ("particular R&D projects can contribute to the development of multiple models, and therefore, when looking at any one model, it is appropriate to count the full amount of R&D expenditures that contributed to the development of that model."), *not reviewed*, EDIS Doc. ID 179530. Nevertheless, when Congress amended section 337 in 1988 to add section 337(a)(3), it intended that universities making substantial domestic research investments could pursue claims under the statute. *Certain Non-Volatile Memory Devices & Prod. Containing the Same*, Inv. No. 337-TA-1046, 2018 WL 6012622, Comm'n Op. at 26 (Oct. 26, 2018) (citing S. Rep. No. 100-71, at 129 (June 21, 1987); H. Rep. No. 100-40, Pt. 1, at 157 (Apr. 6, 1987) (domestic industry definition was added to "encompass universities," among others). This record presents a "classic case" of such investments. *See Certain Marine Sonar Imaging Devices, Incl. Downscan & Sidescan Devices, Prods. Containing the Same, & Components Thereof*, Inv. No. 337-TA-921, Comm'n Op. at 65-66 (Jan. 6, 2016) (quoting *InterDigital*, 707 F.3d at 1298-99).

I find Complainant has shown a nexus between its ER&D expenditures and exploitation of the Asserted Patents.

v. Substantiality of ER&D Investments

Complainant has demonstrated the substantiality of its ER&D investments in various ways. Using the methodology laid out above with respect to sub-prong (B), 18.3% of SSLEEC's total labor expenses are related to the SSLEEC Domestic Industry Products and exploitation of the '529 and '464 patents:

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Total
SSLEEC Labor, ’529 & ’464 Patents	$1,126,130	$1,103,749	$1,097,943	$1,150,842	$1,004,777	**$5,483,442**
Total SSLEEC ER&D Labor	$5,869,665	$6,142,184	$6,149,429	$6,332,135	$5,426,245	**$29,919,659**
% of Total ER&D Labor	19.2%	18.0%	17.9%	18.2%	18.5%	**18.3%**

CDX-0001C.0027 (citing CX-0148-0153, -251, -243, -249, -250, -751-754, and -2079); Tr. (Thomas) at 482:21-483:16 (calculation was deliberately conservative), 483:21-484:4 (same); *see also* CX-0537-CX-0544; CX-0736-CX-0740. A comparable percentage of SSLEEC’s full-time equivalent employees’ work was related to the ’529 and ’464 patents, with 21% of full-time equivalents at SSLEEC devoted to those areas:

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Total
FTEs ’529 & ’464 Patents	17.65	17.95	17.55	16.45	10.36	79.96
Total SSLEEC FTEs	76	80	84	76	61	377
% of Total FTEs	23.2%	22.4%	20.9%	21.6%	17.0%	21.2%

CDX-0001C.0030; Tr. (Thomas) 485:22-486:24; CX-2079; CX-0148–CX-0153; CX-0243; CX-0249–CX-0251; CX-0751–CX-0754.

Similarly, more than a third of SSLEEC’s total investments in plant and equipment are related to the SSLEEC Domestic Industry Products and exploitation of the’529 and ’464 patents, as described above in connection with sub-prong (A):

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Total
SSLEEC Plant & Equipment '529 & '464 Patents	$416,566	$260,152	$372,039	$411,274	$392,790	**$1,852,822**
Total SSLEEC Plant & Equipment Expenditures	$1,134,628	$751,312	$1,033,571	$1,130,970	$1,074,620	**$5,125,102**
% of Total Plant & Equipment	36.7%	34.6%	36.0%	36.4%	36.6%	**36.2%**

CDX-0001C.0028; Tr. (Thomas) 484:5-25.

From FY2016 to FY2020, an average of 20.9% of SSLEEC's total labor, plant, and equipment expenses are related to engineering, research, and development activities having a nexus to the Asserted Patents:

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Total
SSLEEC ER&D All Asserted Patents	$1,542,697	$1,363,901	$1,469,983	$1,562,116	$1,397,568	**$7,336,264**
Total SSLEEC ER&D	$7,004,294	$6,893,497	$7,183,001	$7,463,105	$6,500,865	**$35,044,762**
% of Total SSLEEC ER&D	22.0%	19.8%	20.5%	20.9%	21.5%	**20.9%**

CDX-0001C.0029; Tr. (Thomas) at 484:5-21.

Respondents contend Complainant draws the contextual analysis too narrowly by failing to compare SSLEEC's outlays to that of private industry or another university research center. *See* RRB at 123-124; Tr. (Bakewell) at 1320:13-25, 1321:2-13. As discussed above in parts XI.B.2.b and XI.B.3.b, there is no hard and fast rule that requires comparison to other participants in the same or related industries, particularly where, as here, the investments are in the millions of dollars.

Moreover, where "substantially all of the research and development and engineering for the [domestic industry] was conducted in the United Sates," the industry is "a 'classic case' for the application of subparagraph (C)." *Certain Marine Sonar Imaging Devices, Incl. Downscan &*

Sidescan Devices, Prods. Containing the Same, & Components Thereof, Inv. No. 337-TA-921, Comm'n Op. at 65-66 (Jan. 6, 2016) (quoting *InterDigital*, 707 F.3d at 1298-99). Here, all of the research and development directed to the Asserted Patents and the SSLEEC Domestic Industry Products is conducted in the United States. Tr. (Thomas) at 483:17-20; 485:1-21; Tr. (DenBaars); Tr. (Owens) at 357:19-24.

Based on the record's fulsome contextual evidence, I find that Complainant's investment of $7,336,264 in ER&D related to exploitation of the '529 and '464 patents is substantial, both qualitatively and quantitatively.

b. Licensing Industry Investments

Investments made in pursuit of patent licensing can contribute to a domestic industry. *Certain Computers and Computer Peripheral Devices, and Components Thereof, and Products Containing Same,* Inv. No. 337-TA-841, Comm'n Op. at 27 (January 9, 2014). Here, Complainant has demonstrated that from FY2018 through FY2020, it made a $116,334 investment of labor and capital to license the Asserted Patents and other patents, consisting of $110,112 in domestic licensing labor investments and $6,222 in capital investments. Tr. (Thomas) at 493:16-494:4, 496:9-25. Complainant has shown those licensing efforts resulted in licensing revenue from 2012 through 2020 of approximately [redacted]. Tr. (Englander) at 417:14-20.

i. Nexus to the Asserted Patents

The Commission has explained that complainants "who seek to satisfy the domestic industry requirement by their investments in patent licensing must establish that their asserted investment activities satisfy three requirements of section 337(a)(3)(C)": (1) the investment must exploit the asserted patent, (2) the investment must relate to licensing, and (3) the investment must occur in the United States *Certain Multimedia Display & Navigation Devices & Sys., Components Thereof, & Prod. Containing Same*, Inv. No. 337-TA-694, Comm'n Op. at 7-8 (Aug. 8, 2011)

("*Navigation Devices*"). The licensing investments Complainant claims are for its "filament LED portfolio," which contains 13 patents. Tr. (Englander) at 400:7-11, 407:6-13. Where licensing activities are associated with both asserted and unasserted patents, a key issue is the strength of the nexus between the activities and the asserted patents. *Id.* at 8. The Commission may consider the following *Navigation Devices* factors to determine the "relative importance or value of the asserted patent within the portfolio:"[31]

> (a) the number of patents in the portfolio,
> (b) the relative value contributed by the asserted patent to the portfolio,
> (c) the prominence of the asserted patent in licensing discussions, negotiations and any resulting license agreement, and
> (d) the scope of technology covered by the portfolio compared to the scope of the asserted patent.

Id.

I find the following with respect to the *Navigation Devices* factors:

(a) The SSLEEC portfolio being licensed had only 13 patents. Tr. (Englander) at 400:4-11. Given that the portfolio is relatively small, and the Asserted Patents represent roughly a third of the portfolio, this factor slightly favors a finding of nexus, particularly as there is evidence that all of the patents address the same "core concept." Tr. (DenBaars) at 108:14-109:11 ("Q: And is this core concept present in the asserted patents and the other 13 patents in the SSLEEC filament LED portfolio? A: Yes"). This factor weighs in favor of a finding of nexus.

(b) The evidence on the relative value contributed by the Asserted Patents to the licensing effort is equivocal, including little or no evidence for most of the six

[31] The Commission has stated that "for example, if a licensee's product is an 'article protected by' the patent, then the license is by definition connected to that patent." *Navigation Devices*, 337-TA-694, Comm'n Op., 2011 WL 13383706, *6.

subfactors the Commission has identified as informative on this point. *See Navigation Devices*, 337-TA-694, Comm'n Op., 2011 WL 13383706 at *6.

(c) There is no evidence indicating that the Asserted Patents were particularly prominent in licensing discussions. But neither is there evidence showing the Asserted Patents were unimportant to licensing. This factor is neutral.

(d) The Asserted Patents and the other patents in the SSLEEC filament LED portfolio all practice the same "core concepts," namely, the use of a transparent LED chip with a transparent plate, where the surface of the transparent plate has been optimized by roughening or patterning, configured in a lead frame to allow light to escape in a 360-degree fashion. Tr. (DenBaars) at 108:14-109:11. Dr. DenBaars and Ms. Englander determined that "the filament LED portfolio was both closely related and covered similar products, and that would be the filament LED lighting." Tr. (Englander) at 400:20-25. This factor weighs in favor of finding a nexus to the Asserted Patents.

In light of the above, I find that Complainant's licensing expenses have the requisite nexus to the Asserted Patents.

ii. Substantiality of Licensing Expenses

The *Navigation Devices* factors were articulated by the Commission in a context where the complainant relied exclusively on patent portfolio licensing investments to prove a domestic industry exists. *Navigation Devices*, Comm'n Op. at 24 (complainant admitted it had "no other 'exploitation' or license-related ancillary activities in the United States."). The factors are particularly informative in that context, where the complainant seeks to "satisfy the domestic industry requirement *by* their investments in patent licensing" alone. *See Navigation Devices*, Comm'n Op. at 7 (emphasis added). The factors address the congressional concern that mere

ownership of a patent should not create a domestic industry. *See* S. Rep. No. 71, 100th Cong., 1st Session at 130 (1987) ("[M]ere ownership of a patent . . . would not be sufficient to satisfy" the domestic industry requirement.). But when licensing investments are only one category within a body of evidence showing other types of domestic investments, they must be considered in that fuller context. *See, e.g.*, *Navigation Devices*, Comm'n Op. at 16, 23 (evaluating the complainant's activities "as a whole" and noting that "the existence of other types of 'exploitation' of the asserted *Navigation Devices* patent such as research, development, or engineering" would inform the substantiality of the industry); *see also Certain Printing and Imaging Devices and Components Thereof*, Inv. No. 337-TA-690, Comm'n Op. at 27-28 (February 17, 2011) (the economic prong examines the facts in each investigation, the articles practicing the patent, and the realities of the marketplace).

Although Complainant's investment of $116,334 in licensing is a comparatively small amount in isolation, both in absolute quantitative terms and in comparison to SSLEEC or TIA's operating budget, assessing those expenses in isolation is contrary to the Commission's precedent that domestic industry investments must be understood in the full context of a Complainant's operations. *See Certain Printing and Imaging Devices*, Comm'n Op. at 27-30; *Radioisotope Infusion Systems*, Inv. No. 337 TA-1110, Initial Determination at 147 n. 11 (cautioning again "losing sight of the domestic industry forest by concentrating on each line item tree."), *affirmed in pertinent part*, Comm'n Op. at 41-42, USITC Pub. No. 5025 (Feb. 2021).

I find that Complainant's investment of $7,452,598, which includes licensing investments together with Complainant's investments in ER&D, constitutes a substantial investment under sub-prong (C), for the largely the same reasons discussed *supra* part XI.B.4.

5. Allocation

Complainant contends that all of its investments in epitaxial growth, chip fabrication, and LED transparent packaging relate to articles that practice the ’529 and ’464 patents and did not allocate those investments among particular prototypes. *Id*. at 116-123. Similarly, Complainant contends those same investments, along with licensing investments, show exploitation of all Asserted Patents. CIB at 128-140.

Respondents and Staff contend that Complainant has failed to show that its claimed domestic industry expenses are appropriately allocated “with respect to” articles protected by the Asserted Patents under sub-prongs (A) and (B) and that Complainant has included investments beyond those that “exploit” the Asserted Patents under sub-prong (C). RRB at 118; SIB at 217-225. As explained below, those arguments lack merit.

First, Respondents and Staff criticize the fact Complainant did not specifically compare some prototypes produced at SSLEEC to the patent claims but nevertheless counted expenses to produce those prototypes as part of its industry. Respondents and Staff contend that Complainant’s failure to allocate costs appropriately only for prototypes that practice every element of an Asserted Patent claim is fatal. SIB at 221-228, RRB at 118-122.

The allocation standard urged by Respondents and Staff is not consistent with the text and history of the domestic industry requirement in section 337. Expenses for making prototypes of products that are refined to eventually practice a patent claim have been found to satisfy the statutory requirement of an industry “relating to the articles protected by the patent.” *See* 19 U.S.C. § 1337(a)(2); *Certain Automated Teller Machines, ATM Modules, Components Thereof and Products Containing Same*, Inv. No. 337-TA-972, Initial Determination at 196-198 (Feb. 1, 2017), *not reviewed in pertinent part*, Notice of Comm'n Determ. to Review in Part a Final Initial

Determination (Jan. 30, 2017) (USITC Pub. No. 4927) ("*Automated Teller Machines*"), *affirmed sub nom. Hyosung TNS Inc. v. Int'l Trade Comm'n*, 926 F.3d 1353, 1362 (Fed. Cir. 2019).

Through publications and the testimony of Drs. Wong and DenBaars, Complainant showed its prototypes and research relate to the Domestic Industry Products and the Asserted Patents. Complainant did not claim *all* SSLEEC expenses contributed to the domestic industry but instead provided reasonable estimates of the percentage of SSLEEC's activities, equipment, and laboratory use that related to the SSLEEC Domestic Industry Products and ER&D relating to the Asserted Patents. CIB at 137.

Next, Staff criticizes the inclusion of experimental control devices among the prototypes, pointing out that such controls necessarily lack the patented elements being tested (e.g., transparent submounts). SIB at 222-223. But as Complainant notes, such controls with "conventional packaging" are "integral to the ongoing research of transparent packaging technologies" to provide a baseline for comparison, and because they "contain LED chips from the same crystal epitaxial growth layers and are fabricated in the same way as those in their transparent packaged counterparts." CIB at 17 (citing Tr. (DenBaars) at 108:6-13, 172:4-173:6, 179:7-19; *id.* (Wong) at 326:18-327:3.

No more detailed allocation is necessary on this record because Complainant has shown "SSLEEC's transparent LED research and investments 'contribute equally' to all Asserted Patents" and cannot be divided. CIB at 140-141 (*citing Certain Microlithographic Machines and Component Thereof*, Inv. No. 337-TA-468, Initial Determination at 365 (Jan. 29, 2003)). The Commission has found investments in articles that do not themselves practice the patent can contribute to the domestic industry where those investments were "central to enabling" exploitation of the article covered by the patented claims. *See, e.g., Certain Magnetic Tape*

Cartridges and Components Thereof, Inv. No. 337-TA-1058, Comm'n Op. at 47-57, USITC Pub. No. 4980 (Sept. 2019) (investments in unpatented drives necessary to exploit patented tapes contributed to a domestic industry)*; see also Automated Teller Machines*, Initial Determination at 196-197 (crediting investments in research and development of features that were "required for the product to be commercially viable" as "investments that are closely related to and enable exploitation of the patented technology"). The economic prong does not require "precise numerical allocation"; a "qualitative discussion of the relationship between the patented invention and the domestic investment can suffice." *Certain Marine Sonar Imaging Devices, Including Downscan and Sidescan Devices, Products Containing the Same, and Components Thereof*, Inv. No. 337-TA-921, Comm'n Op. at 64-65 (Jan. 7, 2016) (EDIS Doc. ID 571940).

Dr. DenBaars testified that all of the SSLEEC research areas he counted were necessary for the achievements described in each of the Asserted Patents, and that testimony is largely unrebutted. Dr. DenBaars spent "hundreds and hundreds of hours poring through the papers," reviewing annual review presentations, and talking with SSLEEC faculty and graduate students regarding their estimates to come to this understanding. Tr. (DenBaars) 140:19-141:11, 142:10-16.

Dr. Lebby's conclusory testimony criticizing Dr. DenBaars' testimony was not persuasive, particularly given he admitted he had not "read all the words" of each paper to conclude Dr. DenBaars' testimony was inaccurate. Tr. (Lebby) at 1278:3-4. Nor does Mr. Bakewell's economic criticism of these allocations, Tr. (Bakewell) at 1304:18-1305:15, overcome the weight of the evidence as a whole, which shows a material connection between the SSLEEC research and the claimed inventions. As explained above, the path of research is rarely a straight line, and often meanders. While lines could be drawn to further divide the costs of research among its fruits,

subdivisions of this record beyond the categories identified by Complainant would largely be arbitrary. Dr. DenBaars testified that all of the research he allocated was necessary to reach the resulting patented articles and patent technology; the fact that the total investment for "exploitation" of all four Asserted Patents is roughly the same as SSLEEC's plant, equipment, labor, and capital investment with respect to articles protected by the '529 and '464 patents represents the economic reality of research and is supported by the record.

Because the record establishes that the research efforts of SSLEEC across the three areas of inquiry "contributed equally" to all of the Asserted Patents, I find has reasonably allocated its domestic industry investments to the respective articles and patents.

XII. CONCLUSIONS OF LAW

1. The Commission has subject matter, personal, and *in rem* jurisdiction in this investigation.

2. The importation requirement has been satisfied.

3. Claims 1, 6, and 8 of the '529 patent have not been shown to be infringed.

4. Claims 1, 7, and 9 of the '464 patent have not been shown to be infringed.

5. Claim 1 of the '854 patent has not been shown to be infringed.

6. Claim 1 of the '557 patent has not been shown to be infringed.

7. Claims 1, 6, and 8 of the '529 patent have been shown invalid as anticipated by the prior art under 35 U.S.C. § 102(b).

8. Claims 1, 6, and 8 of the '529 patent have been shown invalid as obvious in view of the prior art under 35 U.S.C. § 103.

9. Claims 1, 7, and 9 of the '464 have been shown invalid as anticipated by the prior art under 35 U.S.C. § 102(b).

10. Claims 1, 7, and 9 of the ’464 have been shown invalid as obvious in view of the prior art under 35 U.S.C. § 103.

11. Claim 1 of the ’854 patent has been shown been shown invalid as anticipated by the prior art under 35 U.S.C. § 102(b).

12. Claim 1 of the ’854 patent has been shown been shown invalid as obvious in view of the prior art under 35 U.S.C. § 103.

13. Claim 1 of the ’557 patent has been shown invalid as anticipated by the prior art under 35 U.S.C. § 102(b).

14. Claim 1 of the ’557 patent has been shown invalid as obvious in view of the prior art under 35 U.S.C. § 103.

15. The technical prong of the domestic industry requirement has been satisfied with respect to the ’529 and ’464 patents if those patent are not invalid, but the technical prong of the domestic industry requirement has not been satisfied with respect to the ’854, and ’557 patents.

16. The economic prong of the domestic industry requirement has been satisfied with respect to all Asserted Patents if those patents are not invalid and if any of the Domestic Industry Products practice those patents.

XIII. RECOMMENDED DETERMINATION ON REMEDY AND BOND

The Commission’s Rules provide that the administrative law judge shall issue a recommended determination concerning the appropriate remedy in the event that the Commission finds a violation of section 337 and concerning the amount of bond to be posted by respondents during Presidential review of the Commission action under section 337(j). *See* 19 C.F.R. § 210.42(a)(l)(ii).

A. Limited Exclusion Order

The Commission has broad discretion in selecting the form, scope, and extent of the remedy in a section 337 proceeding. *Viscofan, S.A. v. U.S. Int'l Trade Comm'n*, 787 F.2d 544, 548 (Fed. Cir. 1986). A limited exclusion order directed to a respondent's infringing products is among the remedies that the Commission may impose. *See* 19 U.S.C. § 1337(d).

Because I have determined that there has been no violation of section 337, I recommend the Commission not issue a limited exclusion order.

Should the Commission determine that a violation did occur, I recommend entry of a limited exclusion order against the Accused Products found to infringe.

Respondents contend any limited exclusion order should "expressly carve out products outside the scope of this Investigation (*e.g.* metal submounts, licensed products . . . and un-adjudicated products) and non-infringing products." RRB at 137 (citing *Certain Robotic Vaccuum Cleaning Devices*, Inv. No. 337-TA-1057, Comm'n Op. at 55-56 (Nov. 30, 2018). Respondents also request a certification provision. *Id.* (citing *Certain Access Control Sys.*, Inv. No. 337-TA-1016, Comm'n Op. at 35 (Aug. 21, 2018). Complaint agrees any LEO should exclude licensed products, and should include a certification provision. CIB at 161. Staff agrees that a certification provision is appropriate, that a carve out for any non-accused product adjudicated as non-infringing would be appropriate, but opposes a carve out for all products falling outside the scope of this investigation. SIB at 246-247.

I recommend the inclusion of a certification provision in any exclusion order entered in this investigation. Respondents sell a variety of goods, including light bulbs, that are not accused in this investigation. A certification provision is appropriate in these circumstances. *Certain Dental Implants*, Inv. No. 337-TA-934, Comm'n Op. at 48, USITC Pub. No. 4905 (July, 2019).

The certification provision will reduce the burden of U.S. Customs in enforcing the exclusion order. *Id.*.

With respect to Respondents' request for a carve out for all products supposedly falling outside of the scope of this Investigation, I do not recommend that the Commission include such a carve out. The standard language in exclusion orders effectuates the result Respondents seek by excluding only articles that infringe except under license or authority of the patent holder, or with the permission of the patent owner. *See Certain Electric Skin Care Devices, Brushes and Charges Therefor, and Kits Containing the Same*, Inv. No. 337-TA-959, Comm'n Op. at 19 (Feb. 13, 2017) (EDIS ID 603444).

I do recommend the inclusion of a carve out for IKEA and Home Depot's metal filament products, which I have affirmatively found do not infringe the Asserted Patents. *See Certain Powered Cover Plates*, Inv. No. 337-TA-1124, Comm'n Op. at 19-20 (July 10, 2020) (EDIS ID 714335) (excluding redesigns found to be non-infringing from the scope of the GEO); *Oligosaccharides*, Inv. No. 337-TA-1120, Comm'n Op. at 18-28 (June 8, 2020) (EDIS ID 712205); *Certain Road Construction Machines and Components Thereof*, Inv. No. 337-TA-1088, Comm'n Op. at 47 (July 15, 2019) (EDIS ID 681394) (including carve out in LEO for machines found to be non-infringing).

B. Cease and Desist Order

Section 337 provides that in addition to, or in lieu of, the issuance of an exclusion order, the Commission may issue a cease and desist order as a remedy for a violation of section 337. 19 U.S.C. § 1337(f)(1). The Commission may issue a cease and desist order when it has personal jurisdiction over the party against whom the order is directed. *Gamut Trading Co. v. U.S. Int'l Trade Comm'n*, 200 F.3d 775, 784 (Fed. Cir. 1999).

Under Commission precedent, "[c]ease and desist orders are generally issued when, with respect to the imported infringing products, respondents maintain commercially significant inventories in the United States or have significant domestic operations that could undercut the remedy provided by an exclusion order." *Certain Air Mattress Systems, Components Thereof, and Methods of Using the Same*, Inv. No. 337-TA-971, Comm'n Op. at 49 (May 17, 2017) (citations and footnote omitted).

Because I find there has been no violation, I do not recommend entry of a cease and desist order. In the alternative, however, I make the following recommendation.

The following table summarizes the inventory for all respondents other than Ikea:

Inventory of Respondents that Entered into Stipulation			
Respondent	**Units**	**Value**	**Source**
Feit (Oct. 20, 2020)	[redacted]	[redacted]	JX-0019C
GE Lighting (Feb. 5, 2021)	[redacted]	[redacted]	JX-0021C
Satco (Jan. 6, 20201)	[redacted]	*See note*[32]	JX-0016C
Home Depot (Aug. 29, 2021)	[redacted]	*Not stated*	JX-0051C, CX-1628C
GVL (Intervenor)	Does not dispute commercial significant inventory		JX-0020C
Signify (Intervenor)	Does not dispute commercial significant inventory		JX-00018C

Tr. (Thomas) at 503:13-504:9; CDX-0001C.0043.

[32] CDX-001C.0043 provides that Satco's commercial inventory has a value of [redacted], the same as that of GE Lighting's, despite GE having roughly 15x the total units in inventory. This appears to be an error, and no total was otherwise provided. *See* Tr. (Thomas) at 503:13-504:9 (referencing CDX-0001C.0043 rather than providing oral testimony with respect to Satco).

With respect to IKEA, Mr. Thomas testified that in October 2020, it had [redacted] units and in March 2021, it had around [redacted] units of Accused Products in inventory. Tr. (Thomas) at 504:10-18. He acknowledged that IKEA asserts that some of its inventory is licensed but claimed that he had no way of determining what was and was not licensed. *Id*. at 504:19-23. However, Mr. Thomas discussed alternative inventory amounts if IKEA products with components from SSLEEC licensee Seoul Semiconductor ("SSC") are removed from the count. *Id*. at 505:6-12, CDX-013C, CDX-014C. With that adjustment, IKEA had a domestic inventory of [redacted] units as of Oct. 29, 2020, and of [redacted] units as of March 2021.

Based on the inventory numbers above and Respondents' ability to stockpile, Mr. Thomas concluded that each Respondent has a commercially significant inventory. Tr. (Thomas) at 503:6-11, 504:24-505:5.

In contrast to Mr. Thomas' opinion evidence, IKEA's fact witness Mr. Rodin testified that IKEA only has [redacted] to [redacted] light bulbs in inventory in the U.S. containing filament LEDs sourced from non-SSC suppliers; he did not believe there would be any such light bulbs in the U.S. in three months. Tr. (Rodin) at 898:11-19, 903:4-15. He also testified that IKEA of Sweden AB does not maintain any inventory of light bulbs in the U.S. *Id*. at 906:12-14. Mr. Rodin testified that any new lighting products that would be imported into the U.S. in the future would contain licensed SSC filaments. *Id*. at 923:9-12.

I find that that Respondents and Intervenors, except for IKEA, have commercially significant inventories of the Accused Products in the United States and therefore cease and desist orders are appropriate.

Accordingly, I recommend that, should the Commission find a violation, the Commission order each Respondent other than IKEA to cease and desist domestic sale and distribution of the

infringing accused products. The cease and desist order should include the same exceptions discussed above concerning the limited exclusion order. *See supra* part XIII.A.

C. Bond During Presidential Review

Pursuant to section 337(j)(3), the administrative law judge and the Commission must determine the amount of bond to be required of a respondent during the 60-day Presidential review period following the issuance of permanent relief. The purpose of the bond is to protect the complainant from any injury. 19 U.S.C. § 1337(j)(3); 19 C.F.R. §§ 210.42(a)(1)(ii), 210.50(a)(3).

When reliable price information is available, the Commission has often set the bond by eliminating the differential in sales prices between the domestic product and the imported, infringing product. *Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, Comm'n Op. at 24, USITC Pub. No. 2949 (1995). In other cases, the Commission has turned to alternative approaches, especially when the level of a reasonable royalty rate could be ascertained. *See Certain Integrated Circuit Telecommunication Chips and Products Containing Same, Including Dialing Apparatus*, Inv. No. 337-TA-337, Comm'n Op. at 41–43, USITC Pub. No. 2670 (1995).

Complainant has presented comprehensive evidence of royalty rates it receives from its numerous licensees and seeks a bond set based those rates. CIB at 163-164. Mr. Thomas testified that the appropriate bond rate should be set differently for retailers and suppliers. Tr. (Thomas) at 506:10-507:13. For retailers that rate is [redacted], and for suppliers it is [redacted]. *Id.* In the alternative, Mr. Thomas acknowledged that the median rates for each category, [redacted], respectively, would also be appropriate. *Id.*

For their part, Respondents do not address bonding in their responsive brief.

In light of the evidence and argument presented, should the Commission determine to enter a remedy, I recommend a bond of 5.0% for all Respondents, which is sufficiently high to protect Complainant from "any injury." *See* 19 U.S.C. § 1337(j)(3); 19 C.F.R. §§ 210.42(a)(1)(ii), 210.50(a)(3).

XIV. INITIAL DETERMINATION ON VIOLATION

For the reasons set forth herein, it is my initial determination that no violation of section 337 of the Tariff Act, as amended, has occurred in the importation into the United States and the sale within the United States after importation of certain light-emitting diodes and products containing the same based on infringement of U.S. Patent No. 9,240,529 ("the '529 patent"); U.S. Patent No. 9,859,464 ("the '464 patent"); U.S. Patent No. 10,593,854 ("the '854 patent"); and U.S. Patent No. 10,658,557 ("the '557 patent").

I hereby certify to the Commission this initial determination and the recommended determination. The Secretary shall serve the confidential version of this initial determination upon

counsel who are signatories to the Protective Order (Order No. 1) issued in this investigation. A public version will be served at a later date upon all parties of record.

Pursuant to 19 C.F.R. § 210.42(h), this initial determination shall become the determination of the Commission unless a party files a petition for review pursuant to 19 C.F.R. § 210.43(a) or the Commission, pursuant to 19 C.F.R. § 210.44, orders on its own motion a review of the initial determination or certain issues therein.

XV. ORDER

Within seven days of the date of this document, the parties shall jointly submit a single proposed public version with any proposed redactions indicated in red. If the parties submit excessive redactions, they may be required to provide declarations from individuals with personal knowledge, justifying each proposed redaction and specifically explaining why the information sought to be redacted meets the definition for confidential business information set forth in 19 C.F.R. § 201.6(a). To the extent possible, the proposed redactions should be made electronically, in a single PDF file using the "Redact Tool" within Adobe Acrobat. The proposed redactions should be submitted as "marked" but not yet "applied." The proposed redactions should be submitted via email to Cheney337@usitc.gov and not filed on EDIS.

All pending motions not otherwise disposed of in this order are denied as moot.

SO ORDERED.

Clark S. Cheney
Administrative Law Judge