UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

LAM RESEARCH CORPORATION,

Plaintiff,

v.

SCHUNK SEMICONDUCTOR, *et al.*,

Defendants.

_____/

No. C-03-1335 EMC

ORDER DENYING DEFENDANT XYCARB'S MOTION RE INTERVENING RIGHTS; GRANTING DEFENDANT XYCARB'S MOTION FOR RECONSIDERATION; AND ORDER RE CLAIM CONSTRUCTION

(Docket Nos. 264, 278)

I. FACTUAL AND PROCEDURAL BACKGROUND

Lam Research Corporation ("Lam") is the owner of the '266 Patent (granted April 27, 2010), which is a reissue of the '456 Patent (granted September 18, 1990). Docket No. 279-14 Exhs. A, B.

Lam instituted this action on March 27, 2003, alleging infringement of its '456 Patent against Xycarb Ceramics, Inc. ("Xycarb") and Schunk Semiconductors, a German company that wholly owns and controls Xycarb. Docket No. 1. On June 19, 2003, Lam applied for a temporary restraining order against Xycarb. Docket No. 15. On August 8, 2003, without ruling on the temporary restraining order, the Court, under Judge Breyer, issued an order construing the key term "bonded" in Xycarb's favor after expedited proceedings. Docket No. 137. Lam filed a motion for reconsideration of the August 8 order, which Judge Breyer granted on November 18, 2003, this time construing the term "bonded" in favor of Lam. Docket No. 154.

On December 12, 2003, Lam filed a reissue patent application ("Reissue Application") for the '456 Patent with the United States Patent and Trademark Office ("USPTO"). In the Reissue

Application, Lam sought to correct an error in Claim 33. Docket No. 279 Exh. 2. On July 8, 2004, Xycarb filed a request for reexamination of the '456 Patent. The reissue patent application and reexamination were merged, also with a third party ex-parte request for reexamination of the '456, into a single consolidated proceeding (the "2004 Reexamination"). Docket No. 279 Exh. 9 at 4-5 of 21.

During the 2004 Reexamination, the patent Examiner issued first a non-final, then a final, rejection of all 36 claims of the '456 Patent. Docket Nos. 279 Exhs. 3, 5. After appeal to the Board of Patent Appeals and Interferences, the Board reversed the Examiner's final rejection and the Examiner ultimately issued a Notice of Allowance on April 27, 2010 as the '266 Reissue Patent. Docket No. 279 Exh. 9. On September 17, 2010, Lam filed a supplemental complaint, alleging infringement of the '266 Patent. Docket No. 191.

Currently pending before the Court is: (1) Xycarb's Motion re Intervening Rights, asserting that it is not liable for infringement of Claim 33 of the '266 Patent because it is not "substantially identical" to Claim 33 of the '456 Patent; (2) Xycarb's Motion for Reconsideration of Judge Breyer's November 18, 2003 order; and (3) claim construction of the '266 Patent.

II. XYCARB'S MOTION RE INTERVENING RIGHTS

Xycarb requests the Court to find that Claims 33 of the '456 Patent and the '266 Reissue Patent are not "substantially identical," and thus to grant Xycarb intervening rights. It also asserts that Lam made other changes to the '456 Patent without bringing them to the attention of the USPTO during the reissue and reexamination process, and thus the Court should construe terms in its favor.

A. Legal Standard

Patent reissue is governed by 35 U.S.C. § 252, which from November 2, 2002 to September 15, 2012 provided in part:

> Whenever any patent is, through error without any deceptive intention, deemed wholly or partly inoperative or invalid, by reason of a defective specification or drawing, or by reason of the patentee claiming more or less than he had a right to claim in the patent, the Director shall, on the surrender of such patent and the payment of the fee required by law, reissue the patent for the invention disclosed in the original patent . . .

35 U.S.C. § 251 (2010). A patentee may correct an error or ambiguity through reissue. *See, e.g.*, *Slimfold Mfg. Co., Inc. v. Kinkead Indus., Inc*., 810 F.2d 1113, 1116 (Fed. Cir. 1987) (upholding amendments patentee made during reissue proceedings to make claim definite), *quoting In re Altenpohl*, 500 F.2d 1151, 1156 (C.C.P.A. 1974) ("the 'patentee should be allowed to correct an error or ambiguity without having to rely on implication or litigation'")).

The doctrine of intervening rights was developed to prevent injustice "where a third party, having already begun to make, use, or sell a given article, finds its previously lawful activities rendered newly infringing under a modified [reissue] patent." *Marine Polymer Technologies, Inc. v. HemCon, Inc.*, 672 F.3d 1350, 1361 (Fed. Cir. 2012). The doctrine was codified in 35 U.S.C. § 252, which provides for two types of intervening rights:

> (1) intervening rights that abrogate liability for infringing claims added to or modified from the original patent if the accused products were made or used before the reissue, often referred to as absolute intervening rights; and (2) intervening rights that apply as a matter of judicial discretion to mitigate liability for infringing such claims even as to products made or used after the reissue if the accused infringer made substantial preparations for the infringing activities prior to reissue, often referred to as equitable intervening rights.

Marine Polymer Technologies, Inc. v. HemCon, Inc., 672 F.3d 1350, 1361-62 (Fed. Cir. 2012). Intervening rights do not accrue, however, if "the claims in the original and reissued patents are substantially identical." 35 U.S.C. § 252; *id*. at 1362. Claims in the reissue patent that are substantially identical with claims in the original patent "reach back to the date the original patent issued." *Seattle Box Co., Inc. v. Industrial Crating & Packing, Inc*., 731 F.2d 818, 827 (Fed. Cir. 1984).

The standard for whether the claims at issue are "substantially identical" is "whether a particular change to the claims is substantive, such that the scope of the claims is no longer substantially identical." *Laitram Corp. v. NEC Corp.*, 952 F.2d 1357, 1361 (Fed. Cir. 1991). "'[I]t is the scope of the claim that must be identical, not that the identical words must be used.'" *Westvaco Corp. v. International Paper Co.*, 991 F.2d 735, 741 (Fed. Cir. 1993) (quoting *Slimfold Mfg. Co., Inc. v. Kinkead Indus., Inc.*, 810 F.2d 1113, 1115 (Fed. Cir. 1987)). "An amendment that

clarifies the text of the claim or makes it more definite without affecting its scope is generally viewed as identical for the purpose of § 252." *Bloom Engineering Co., Inc. v. North American Mfg. Co., Inc*, 129 F.3d 1247, 1250 (Fed. Cir. 1997) (citations omitted). In making this determination, a claim is interpreted in light of "'the prior art, the prosecution history, other claims, and any other pertinent information.'" *Westvaco Corp.*, 991 F.2d at 742 (quoting *Laitram Corp.*, 952 F.2d at 1361).

B. Application

1. Claims 33 of the '456 Patent and the '266 Patent are "substantially identical"

Claim 33 reads:

> A method for forming an electrode assembly including a support ring and an electrode plate, said method comprising:
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> bonding the support ring about the periphery of the electrode plate at elevated temperature, wherein the material of the [electrode plate] *support ring* has a higher coefficient of thermal expansion than that of the electrode plate; and
>
> allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress.

Enclosed in brackets is what was in the original '456 Patent; in italics is what is in the '266 Reissue Patent. Lam applied for a reissue patent to correct this error (and another error that is not at issue in the present dispute). *See* Docket No. 279 Exh. 2 at 16 of 58. Lam asserts that this was a mere drafting error, while Xycarb asserts that replacing "electrode plate" with "support ring" was a substantive change.

The Court first notes that throughout the 2004 Reexamination, the Examiner assumed Claim 33 of the '456 Patent stood as with the correction. *E.g.*, Docket No. 279 Exh. 7 at 51 of 54 ("Independent claim 33 sets forth a method for forming an electrode assembly including a support ring and an electrode plate . . . wherein the material of the *support ring* has a higher coefficient of thermal expansion than that of the electrode plate . . . .") (emphasis added). In other words, the correction Lam sought through reissue was granted, though perhaps not expressly. The 2004 Reexamination focuses instead on reexamining the patentability of the '456 Patent under 35 U.S.C.

§ 102(b) for lack of novelty and under 35 U.S.C. § 103(a) for obviousness. *See* Docket No. 279 Exhs. 2-9.

Even if the Court were to consider the question afresh, the Court would construe Claim 33 of the '456 Patent as it stands corrected in the '266 Patent. "A district court can correct a patent only if (1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims." *Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1354 (Fed. Cir. 2003).

a. The Correction is not Subject to Reasonable Debate Based on Consideration of the Claim Language and the Specification

The typographical nature of the correction is not subject to reasonable debate. This is evident from the claim language itself. The statement in Claim 33 that "the *electrode plate* has a higher coefficient of thermal expansion than that of the electrode plate" does not make sense as stated. (The corrected "electrode plate" and correction, "support ring," will be written in italics.) Judge Breyer also notes, "This claim is confusingly worded. It is unclear how the coefficient of thermal expansion of the electrode plate can be greater than that of the electrode plate." Docket No. 137 at 8. Claim 33 only makes sense if *electrode plate* reads *support ring*. Claim 33 begins by talking about an electrode assembly with two components, a support ring and an electrode plate, then bonding the support ring and electrode plate, and utilizing a difference in coefficients of thermal expansion of *something* and the electrode plate. Although this *something* is stated as *electrode plate*, it obviously should be *support ring*, since there is only one electrode plate under discussion and the Claim has hitherto talked about the assembly's two components, the support ring and electrode plate.

The nature of the correction is also evident from the specification. The specification states that the *support ring* (or support frame) should have a higher coefficient of thermal expansion than the electrode plate, in the same context of forming the assembly and utilizing the difference in contraction rates to create compressive stress. *See* '456 Patent col. 6:67-7:6 ("by utilizing a support ring which is formed from a material which has a slightly larger thermal expansion coefficient than that of the electrode plate, and forming or curing the bonding layer . . . the support ring will apply a

constant compressive force on both the electrode plate and the bonding layer"); *Id.* col. 3:6-11 ("the support frame is chosen to have a slightly greater coefficient of thermal expansion [than the electrode plate]. By then joining and/or curing the bonding layer at a temperature above the expected operating temperature of the electrode, the electrode plate will be maintained under compression . . .").

Xycarb asserts it is only appropriate to look to the specification for guidance when the meaning of a disputed word or phrase in a claim is uncertain. It argues that since the meaning of *electrode plate* is undisputed and certain, the Court should not look to the specification. The point, however, is not that the meaning of "electrode plate" is ambiguous, but that the phrase "*electrode plate* ha[ving] a higher coefficient of thermal expansion than that of the electrode plate" is. Moreover, *Novus Indus* expressly requires consideration of the specification in deciding whether a correction would be appropriate.

Xycarb cites *Chef Am., Inc. v. Lamb-Weston, Inc*., 358 F.3d 1371, 1374 (Fed. Cir. 2004) for the proposition that district courts may not redraft claims to make them operable or sustain their validity. There, the claim recited "heating the . . . dough to a temperature in the range of about 400F. to 850F." *Id*. The Federal Circuit was unwilling to redraft the claim as the patentee desired, so that the temperature would be that of the oven, not the dough, since the dough "would be burned to a crisp." *Id*. at 1373. The court held: "Where, as here, the claim is susceptible to only one reasonable construction . . . we construe the claim as written, not as the patentees wish they had written it. As written, the claim unambiguously requires that the dough be heated to a temperature range of 400° F. to 850° F." *Id*. at 1374. Here, however, Claim 33 is non-sensical as written, and the only reasonable construction is to replace *electrode plate* with *support ring*. Moreover, the context provided by the rest of the claim language and specification makes clear this was a typographical error. *Chef Am.* did not involve similar circumstances and is inapposite.

b. <u>The Prosecution History Does not Suggest a Different Interpretation of the Claim</u>

Xycarb asserts that Lam changed *electrode plate* to *support ring* to overcome a prior Japanese patent of Shigeru. Xycarb's argument is based entirely on purported references to two

electrode plates common to the '456 Patent and Shigeru. Xycarb points to the Examiner's statement, "Shigeru teaches bonding the backing plate to an electrode plate (silicon dioxide) at elevated temperature . . . wherein the material of the *electrode plate* (Cu) has a higher coefficient of thermal expansion than that of the electrode plate (silicon dioxide)." Docket No. 279 Exh. 3 at 11-12 of 14. As Lam points out, however, the Examiner's allusion to two electrode plates in Shigeru is a misstatement. Shigeru's patent does not mention electrode plates, but a "backing plate" and a "silicon dioxide plate"/"target." *See* Docket No. 284-2 Exh. B (Shigeru Patent). Moreover, the Examiner's rejections of Claim 33 of the '456 Patent was not based on the two electrode plates purportedly appearing in both the '456 Patent and Shigeru. Rather, the Examiner assumed Claim 33 stood as corrected, but rejected it as being unpatentable over Shigeru in view of another prior art reference, Yamada:

> Yamada teaches a [sic] forming an electrode assembly including a support ring and an electrode plate . . . . It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the *backing plate and electrode plate* [of Shigeru] to utilize forming an electrode assembly having a *support ring and electrode plate* . . . .

Docket No. 279 Exh. 3 at 13 of 14, Exh. 5 at 13 of 16 (emphasis added).

Looking further to the substance, Shigeru's patent pertains to a "bonding method for a sputtering target," and it is unclear whether this has anything to do with an electrode assembly. Docket No. 284-2 Exh. B at 2 of 9; *Cf.* Docket No. 265 Exh. 5 (Board of Patent Appeals' reversal of Examiner's final rejection of the '456 Patent) at 11, 17 of 21 (finding that the Examiner failed to explain "why a person having ordinary skill in the art would have had a reasonable expectation that the technique described for bonding Shigeru's . . . sputtering target . . . would work in Takao's etching apparatus . . ."). Thus, there is no evidence to support Xycarb's contention that Lam amended Claim 33 to overcome Shigeru.

The *electrode plate* in Claim 33 of the '456 Patent should have read *support ring*. This would make Claims 33 of the two Patents identical verbatim. They are thus "substantially identical." This conclusion accords with the Examiner's grant of the amendment Lam sought in its Reissue Application.

2. Xycarb's Argument that the Court Should Construe Terms in Its Favor Because Lam Failed to Notify the Court and the USPTO of Changes to the '456 Patent Lacks Merit

Xycarb points to changes to the '456 Patent present in the '266 Patent that Lam failed to bring to the attention of the USPTO during the reissue and reexamination process. All but one change, in Claim 25, is in the specification.

Xycarb asserts that the changes in the specification "have impacted the Court's ability to construe 'bonded'" and "bonding layer," and thus the Court should adopt Xycarb's construction of these terms. It is true that a number of words have been changed from the '456 Patent. *See* Docket No. 279-14, where the changes have been highlighted. Many appear to be typographical errors, (*e.g.*, "enchant" in the '266 Patent should be "etchant" as in the '456 Patent) and a few are puzzling (*e.g.*, "the material of the support frame . . . should allow *attachment* within the reactor by bolting or other conventional fasteners" ('456 Patent 2:67) has been changed to "the material of the support frame . . . should allow *treatment* within the reactor by bolting or other conventional fasteners" ('266 Patent 2:64)). However, Xycarb fails to show how these changes are material. Indeed, the Court finds them irrelevant to its claim construction below.

Xycarb asserts that the change to Claim 25 warrants invalidation of Claim 25 and its independent claims 26-28. In the '266 Patent, Claim 25 reads, "[a]n electrode assembly as in claim **14** . . . ," while in the '456 Patent it reads, "[a]n electrode assembly as in claim **24** . . . ." The change appears to be a typographical error, because Claim 14 claims a reactor, not an electrode assembly, and Claim 25 makes sense only if it depends on Claim 24. In any case, the change and its cause are inconsequential, however, because Lam represented in its Disclosure of Asserted Claims and Infringement Contentions that these claims are not asserted as part of Lam's infringement contentions. Motion re Intervening Rights at 18. Therefore, this issue is not ripe for the Court's adjudication.

Thus, the Court **DENIES** Xycarb's Motion re Intervening Rights.

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III. XYCARB'S MOTION FOR RECONSIDERATION

A. Procedural and Factual Background

Xycarb moves for reconsideration of Judge Breyer's claim construction order of November 18, 2003. Docket No. 154 ("Order II"). In the order, Judge Breyer construes the term "bonded" in Claim 18 of the '456 Patent. The reasoning in its entirety reads:

> After carefully considering the pleadings filed by the parties, including the supplemental pleadings filed at the request of the Court, the Court GRANTS plaintiff's motion for reconsideration. "Bonded" as used in claim 18 of the '456 means (1) a connection between the electrode plate and support ring that has the strength necessary to hold these parts together in use, and that is capable of achieving the necessary (2) electrical conductivity and (3) thermal conductivity. Claim 32 does not support the Court's previous exclusion of "bonded by means of a shrink fit" from the meaning of "bonded" in claim 18.

The Court's construction comes straight out of the specification: "The support ring may be bonded to the electrode plate by any suitable process which provides the necessary bonding strength as well as thermal and electrical characteristics." '456 Patent col. 5:64-67.

The order was issued as a result of Lam's own motion for reconsideration of Judge Breyer's previous claim construction order of August 7, 2003. Docket No. 137. In the August 7 order, Judge Breyer found that Claim 32 "describes the very essence of a 'shrink fit,'" but that shrink fitting is a not form of bonding. *Id*. at 7. It was "a separate step to be performed in addition to bonding"; "an additional step beyond bonding." *Id*. at 7, 8.

Local Rule 7-9 sets forth three grounds on which a party may make a motion for leave to file a motion for reconsideration. Relevant here is 7-9(b)(2): "The emergence of new material facts or a change of law occurring after the time of such order." Xycarb asserts that reconsideration is warranted because of a change of law and emergence of new material facts: (1) Lam's prior briefing in support of its motion for reconsideration was premised on a standard rejected by the Federal Circuit after Order II was issued and (2) under the doctrine of prosecution history disclaimer, Lam disclaimed bonding "by any suitable process" during prosecution proceedings that occurred after Order II was issued. This Court granted Xycarb's motion for leave to file a motion for reconsideration on these grounds. Docket No. 266.

B. The Change in Law Brought by *Phillips* Does Not Warrant Reconsideration

Xycarb asserts that the Court should reconsider Judge Breyer's construction of "bonded" as used in Claim 18 because *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), changed the law on claim construction that had been set forth by *Texas Digital Systems, Inc. v. Telegenix Inc.*, 308 F.3d 1193 (Fed. Cir. 2002).

It has been a long-standing principle, changed neither by *Phillips* nor *Texas Digital*, that "the words of a claim 'are generally given their ordinary and customary meaning,'" and that "the ordinary and customary meaning of a claim term is the meaning that the term would have to a person or ordinary skill in the art in question at the time of the invention." *Phillips*, 415 F.3d at 1312-13 (citing numerous Federal Circuit cases since the 1990s to this effect). What *Phillips* changed is the relative importance of intrinsic and extrinsic evidence in determining the "ordinary and customary meaning." *Phillips* reiterated the principle that "'[t]he best source for understanding a technical term is the specification from which it arose, informed, as needed, by the prosecution history,'" and held that *Texas Digital* had "placed too much reliance on extrinsic sources such as dictionaries, treatises, and encyclopedias and too little on intrinsic sources, in particular the specification and prosecution history." *Id.* at 1320 (quoting *Multiform Dessicants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1478 (Fed. Cir. 1998)).

Xycarb argues that the Court should reconsider Order II, because Lam's briefing (for its motion for reconsideration) relied on the legal standard of *Texas Digital* in advocating its construction of "bonded." Motion for Reconsideration at 9. Xycarb's argument has very limited reach, however, because Judge Breyer did not provide the basis for his decision. Because the Court cannot possibly determine whether Judge Breyer relied on the portion of *Texas Digital* that *Phillips* overturned, it cannot grant reconsideration based on the change in law brought by *Phillips*.

C. Prosecution History Disclaimer Warrants Reconsideration

Representations made to the USPTO during prosecution may be material to reconsideration of claim construction, since they can narrow the scope of a claim:

> [A] clear and unmistakable disavowal during prosecution overcomes the "heavy presumption" that claim terms carry their full ordinary and customary meaning. Thus, when the patentee unequivocally and

> unambiguously disavows a certain meaning to obtain a patent, the doctrine of prosecution history disclaimer narrows the meaning of the claim consistent with the scope of the claim surrendered.

Biogen Idec, Inc. v. GlaxoSmithKline LLC, 713 F.3d 1090, 1094-95 (Fed. Cir. 2013) (citations omitted).

The specification states that "[t]he support ring may be bonded to the electrode plate *by any suitable process* which provides the necessary bonding strength as well as thermal and electrical characteristics." '266 Patent col. 5:53-56 (emphasis added). However, the prosecution history shows that Lam disclaimed bonding "by any suitable process." During the 2004 Reexamination, the Examiner rejected most of the claims of the '456 Patent on grounds that they were anticipated by a prior art reference, Takao. Lam states in response to the Examiner's final rejection of claims 1-36 of the '456 Patent:

> The Examiner's interpretation of "bonded" is inconsistent with usage of that term in the '456 Patent. While terms such as "attachment" (column 2, line 67), "mounting" (column 5, line 13), "secured" (column 6, line 23), and "attached" (column 8, line 13) could be interpreted to include bonding or mechanically attaching via "bolting" (column 2, line 68) or "fasteners" (column 3, line 1), in the '456 patent, the term "bonded" is used in the conventional sense to describe a joint between two surfaces and thus excludes unbonded surfaces clamped together with a mechanical structure.

Docket No. 265 Exh. 2 at 24 of 120. Lam thus "unequivocally and unambiguously" disavowed clamping with a mechanical structure. The parties do not disagree. *See* Opp. to Motion for Reconsideration at 9.

Thus, the prosecution history shows Judge Breyer's construction of "bonded" – (1) a connection between the electrode plate and support ring that has the strength necessary to hold these parts together in use, and that is capable of achieving the necessary (2) electrical conductivity and (3) thermal conductivity – is too broad. It was disavowed in Lam's prosecution at least in part. Further, as discussed below, Judge Breyer's construction reflected "[a] manifest failure by the Court to consider "dispositive legal arguments." Local Rule 7-9(b)(3). Thus, the Court **GRANTS** Xycarb's Motion for Reconsideration.

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IV. CLAIM CONSTRUCTION

A. Legal Standard

Claim construction is a question of law to be determined by the Court. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) ("in a case tried to a jury, the court has the power and obligation to construe as a matter of law the meaning of language used in the patent claim"). "The purpose of claim construction is to 'determin[e] the meaning and scope of the patent claims asserted to be infringed.'" *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1360 (Fed. Cir. 2008).

> Words of a claim are generally given their ordinary and customary meaning, which is the meaning a term would have to a person of ordinary skill in the art after reviewing the intrinsic record at the time of the invention. "In some cases, the ordinary meaning of claim language . . . may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." However, in many cases, the meaning of a claim term as understood by persons of skill in the art is not readily apparent.

Id.

> Because the meaning of a claim term as understood by persons of skill in the art is often not immediately apparent, and because patentees frequently use terms idiosyncratically, the court looks to "those sources available to the public that show what a person of skill in the art would have understood disputed claim language to mean." Those sources include "the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art."

Phillips v. AWH Corp., 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc) (internal citations omitted).

"[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id*. at 1315 (quoting *Vitrionics Corp. v. Conceptronic, Inc*., 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "It is therefore entirely appropriate for a court, when conducting claim construction, to rely heavily on the written description for guidance as to the meaning of the claims." *Id*. at 1317.

On the other hand, courts must avoid "importing limitations from the specification into the claim." *Id*. at 1323. In particular, "although the specification often describes very specific embodiments of the invention," courts must not "confin[e] the claims to those embodiments." *Id*.

B. Representative Claims

The claims containing the disputed terms are as follows: 1, 5, 10, 11, 15, 18, 24, 29, 32, 33. Claims 1, 18, and 33 are independent; the remaining are dependent. The text of the claims is provided below (with terms to be construed in bold).

> **Claim 1.** An improved reactor of the type having a first electrode for supporting a substrate, an opposed electrode, and means for producing a plasma there between, wherein the opposed electrode has one face exposed to the first electrode and an opposite face connected to an electrical source and a thermal sink, the improvement comprising an opposed electrode including (a) an electrode plate composed of a substantially pure material and **having a substantially uniform thickness** and (b) a support frame composed of an electrically and thermally conductive material **bonded** to a back **face of the plate**, whereby the support frame is connected to the electrical source and thermal sink and a front face of the plate which is exposed to the first electrode is substantially free from protuberances.
>
> **Claim 5.** An improved reactor as in claim 3, wherein the support frame comprises a ring which is secured **about the periphery** of the disk.
>
> **Claim 10.** An improved reactor as in claim 1, wherein the plate is **bonded** to the support frame by means of a **bonding layer**.
>
> **Claim 11.** An improved reactor as in claim 10, wherein the **bonding layer** is composed of a material having a low vapor pressure.
>
> **Claim 15.** An improved reactor as in claim 10, wherein the **bonding layer** is substantially free from voids and has substantially uniform electrical and thermal conductivities through the **region of bonding**.
>
> **Claim 18.** An electrode assembly comprising:
> an electrode disk composed of a substantially pure material and having a **substantially uniform thickness**; and
> a support ring **bonded about the periphery** of one **face of the disk**, leaving the other face substantially flat and free from protuberances, wherein the support ring is composed of an electrically and thermally conductive material.
>
> **Claim 24.** An electrode assembly as in claim 18, wherein the disk is **bonded** to the ring by means of a **bonding layer**.
>
> **Claim 29.** An electrode assembly as in claim 24, wherein the **bonding layer** is substantially free from voids and has substantially uniform electrical and thermal conductivities through the **region of bonding**.
>
> **Claim 32.** An electrode assembly as in claim 18, wherein the support ring is **pre-stressed to impart a radially inward compression** on the electrode disk.

> **Claim 33.** A method for forming an electrode assembly including a support ring and an electrode plate, said method comprising: bonding the support **about the periphery** of the electrode plate at elevated temperature, where in the material of the [electrode plate] *support ring* has a **higher coefficient of thermal expansion** than that of the electrode plate; and allowing the bonded assembly to return to room temperature, whereby the **differential contraction** imparts the **desired stress**.

C. Construction of Terms

1. Term 9: "bonding layer"

Lam	Xycarb	Court
A layer that allows for or assists in the bonding as defined in Term No. 8.	A ductile layer of bonding material at the region of bonding of the support frame and electrode plate that prevents breaking or fracturing of the bond between the support frame and the electrode plate, or the plate itself	A layer of bonding material between the support frame and electrode plate that holds these parts together in use

As a preliminary matter, Lam states that there is no need for the Court to construe this term because it appears only in claims that Lam does not assert in this action. Lam's Opening Br. at 20. The Court construes the term, however, because, as will be seen below, it appears in a portion of the specification ('266 Patent col. 6:48-64) that is essential to construing "bonded."

The Court essentially adopts Lam's construction, but avoids reference to the term "bonded," which is heavily disputed. The Court's construction makes clear that a "bonding layer" requires bonding material. This is implicit in the word "layer," but is also supported by the language of Claims 11 and 13: "wherein the bonding layer is composed of a material having a low vapor pressure . . . "; "wherein the bonding layer is formed by brazing, soldering, or adhesion . . . ."

Lam does not include "ductile" in its proposed construction, but does not object to its inclusion. Lam's Opening Br. at 25. However, a bonding layer that is "ductile" is merely a preferred embodiment, and thus, is not properly a part of the construction of "bonding layer." *See Halliburton Energy Services, Inc. v. M-I LLC*, 514 F.3d 1244, 1250-51 (Fed. Cir. 2008) (declining to import a limitation of a preferred embodiment into the construction of a term notwithstanding the

patentee's request to do so). The specification indicates that ductility is not required; it is merely desirable when there is a mismatch in thermal expansion coefficients between the support frame and electrode plate:

> The material of the support frame will usually be chosen to have a thermal expansion coefficient which is generally compatible with that of the electrode plate, but a certain amount of mismatch can be tolerated when the bonding layer is formed from a ductile material.

'266 Patent col. 2:65-3:3.

> Typically, bonding will be performed by either brazing, soldering or use of adhesives to form a ductile bonding layer . . . . The ductility is desirable so that any thermal expansion mismatch between the electrode plate and support ring will not result in breaking or fracturing of the bond or the electrode plate.

'266 Patent col. 5:56-62. Thus, the Court declines to add "ductile" to the construction.

Xycarb's construction unnecessarily imports from the specification the limitation that a bonding layer "prevents breaking or fracturing of the bond" or the plate. The second passage from the specification quoted above indicates that breaking or fracturing of the bond or electrode plate is a concern when there is a mismatch between the thermal expansion coefficients. The first passage indicates that a mismatch in thermal expansion coefficients is not necessary in which case ductility would not be required. Therefore, the addition Xycarb seeks would be an improper limitation on the construction.

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2. Term 6: "pre-stressed to impart a radially inward compression"

Lam	Xycarb	Court
causing the support ring to be placed in such a state that, when formed as an electrode assembly, the support ring applies a constant compressive force to the electrode disk in a radially inward direction relative to the face of the electrode disk	A support ring formed from a material which has a larger thermal coefficient than that of the electrode plate, heating the support ring and electrode disk to a temperature above the expected operating temperature and then forming or curing a bonding layer between these two parts while maintaining a temperature above the expected operating temperature such that, when the support ring and electrode disk are cooled to room temperature, the support ring applies a constant compressive force on both the electrode disk and the bonding layer, which radiates inwards towards the center of the electrode disk.	causing the support ring to apply a constant compressive force to the electrode disk in a radially inward direction. To achieve the pre-stress, the support ring is formed from a material that has a larger coefficient of thermal expansion than the electrode disk, and the bonding layer is formed or cured at a temperature above the expected operating temperature.

The term appears only in Claim 32, which recites, "[a]n electrode assembly as in claim 18, wherein the support ring is *pre-stressed to impart a radially inward compression* of the electrode disk." Xycarb's proposed definition is essentially taken from the following portion of the specification, in particular, from the sentence beginning "More specifically . . . ":

> In forming the electrode assembly 10, it will be desirable to "*pre-stress*" the support ring 14 so that it provides a radially directed inward compression on the electrode plate 12. Such a compressive stress helps to inhibit stress of the electrode plate during use. More specifically, by utilizing a support ring 14 which is formed from a material that has a slightly larger thermal expansion coefficient than that of the electrode plate, and forming or curing the bonding layer at a temperature above the expected operating temperature, the support ring will apply a constant compressive force on both the electrode plate and the bonding layer.

'266 Patent 6:48-58 (emphasis added). This is the only place in the specification where pre-stress is expressly mentioned.

Citing *Phillips*, Lam objects that Xycarb "impermissibly seeks to add limitations from the specification that are not present in the language of Claim 32." *See Phillips*, 415 F.3d at 1323 (warning against "importing limitations from the specification into the claim"). Lam Opening Br. at 23. The question is whether the sentence beginning "More specifically, by utilizing a support ring . . . ," which will be denoted (✻), is a limitation on "pre-stress" of the support ring or a description of what pre-stress is. In other words, the issue is whether the two conditions, (1) that the support ring has a higher thermal expansion coefficient than the electrode plate and (2) that the bonding layer is formed or cured at elevated temperatures, define the process of pre-stressing the support ring or is merely one example of the process.

The quotation marks surrounding pre-stress in the first sentence indicate that pre-stress will shortly be explained or defined, and (✻) follows, explaining how to cause the support ring to exert compression on the electrode plate, in clear reference to the first sentence. Nothing suggests that the statement (✻) is merely providing one specific method of pre-stressing the support ring. Without (✻), a description of "pre-stress" would be lacking. This indicates that (✻) is explaining or defining pre-stress of the support ring rather than limiting it.

The prosecution history also shows that (✻) is an explanation rather than a limitation. *See CVI/Beta Ventures, Inc. v. Tura LP*, 112 F.3d 1146, 1158 (Fed. Cir. 1997) ("through statements made during prosecution or reexamination an applicant for a patent or a patent owner, as the case may be, may commit to a particular meaning for a patent term, which meaning is then binding in litigation"). In its appeal brief to the Examiner's final rejection, Lam distinguishes its invention from Takao and Shigeru as follows:

> Neither reference discloses the desirability of imparting a radially inward compression on a showerhead electrode which can inhibit stress fracturing the electrode during use (see '456 patent at column 6, lines 62-67). *To achieve the pre-stress* the support ring has a larger thermal expansion than the electrode plate and the bond is cured or formed at a temperature above the operating temperature, the support ring will apply a constant compressive force on the electrode plate and bonding layer (column 7, lines 1-6 of '456 patent). Because neither Takao nor Shigeru disclose such a concept . . .

Docket No. 279 Exh. 6 at 103 of 120 (emphasis added). Here, pre-stress is equated with the description in (✻). Thus (✻) is not a limitation, but the meaning of "pre-stress."

3. Term 8: "bonded"

Lam	Xycarb	Court
"Bonded" means a (1) connection between the electrode plate and support ring that has the strength necessary to hold these parts together in use, and that is capable of achieving the necessary (2) electrical conductivity and (3) thermal conductivity.	Connected by any suitable material which provides the necessary bonding strength as well as thermal and electrical characteristics, but does not include unbonded surfaces connected by exerting a mechanical force.	"Bonded" means a (1) connection between the electrode plate and support ring that has the strength necessary to hold these parts together in use, and that is capable of achieving the necessary (2) electrical conductivity and (3) thermal conductivity, but (4) excludes connections maintained solely by mechanical force.

As discussed above, given the prosecution history disclaimer, Lam's proposed definition should be narrowed at least to exclude "unbonded surfaces clamped together with a mechanical structure." The parties do not dispute the basic mechanics of shrink fitting. The parties' dispute revolves around whether shrink fitting constitutes clamping with a mechanical structure, and more generally, whether bonding excludes shrink fitting.

a. Prosecution History Disclaimer

i. Lam Did Not Disclaim Shrink Fitting

As discussed above, Lam disavowed mechanical clamping as a means of bonding. Xycarb asserts that shrink fitting is similar to clamping because it is "a mechanical assembly process" that only requires interference of the component parts. Docket No. 288 (Lin Decl.) ¶ 10. According to Xycarb, shrink fitting enables the outer member to "clamp tightly" around the inner member so that the two are held together by "mechanical clamping." Docket No. 289 (Maltiel Decl.) ¶ 17.

However, the prosecution history indicates that Lam's disclaimer of "clamp[ing] together with a mechanical structure" did not extend to clamping that results from shrink fitting. Lam made its disclaimer to overcome Takao. The Examiner described Takao's invention as follows: "the support frame (electrode body 4) comprises a ring (sealed ring 12) which is secured above the periphery of the disk (electrode 7)" and "the insulating ring coupled with the sealing ring bonds or fastens the electrode (7) to the frame (4)." Docket No. 265 Exh. 3 at 19 of 54. Thus, Takao

disclosed fastening the electrode disk to the frame with a clamp in the form of a ring (12), which was separate from the two components (4 and 7). This coincides with the primary notion of clamping, achieved by a clamp that is distinct from the components that it holds together. *See, e.g.*, Oxford English Dictionary ("to fasten with a clamp or clamps"; the primary definition of the noun "clamp" is: "a brace, clasp, or band, usually of iron or other rigid material, used for giving strength and support to flexible or movable objects, or for fastening two or more things securely together").

Thus, because Lam disclaimed clamping with a mechanical structure to overcome Takao and Takao did not in any way disclose shrink fitting, Lam did not disclaim shrink fitting by disclaiming clamping with a mechanical structure.

ii. Lam Did Not Limit Bonding to Soldering, Brazing and Adhesive Joints

Xycarb argues that "weight should be given to the fact that the PTO understood Lam's definition of 'bonded' to only encompass 'soldering,' 'brazing,' and 'adhesive joints.'" Xycarb's Responsive Claim Construction Br. at 14. The Examiner had stated:

> The appellants also state that "bonding" would be given a (comparatively narrow) definition of joining by "soldering," "brazing," and "adhesive joints" (see pages 24 and 25 of brief). The examiner respectfully disagrees with these statements. During patent examination, the pending claims must be "given the broadest reasonable interpretation." . . . In the instant case, the broadest reasonable interpretation of the term "bonded" would mean "something that fastens things together."

Docket No. 265 Exh. 3 at 18 of 54. The Examiner did not himself construe "bonding" to be limited to soldering, brazing, and adhesive joints. Nor did the Board of Appeal. *See* Docket No. 265 Exh. 5 at 17 of 21. Therefore, there can be no estoppel effect.

Moreover, there is no evidence that Lam represented to the Examiner that "bonding" would be limited to soldering, brazing and adhesive joints. The statement of Lam cited by Xycarb stated:

> The Examiner's interpretation of "bonded" is inconsistent with the usage of that term in the '456 patent. While terms such as "attachment" (column 2, line 67), "mounting" (column 5, line 13), "secured" (column 6, line 23) and "attached" (column 8, line 13) could be interpreted to include bonding or mechanically attaching via "bolting" (column 2, line 68) or "fasteners" (column 3, line 1), in the '456 patent the term "bonded" is used in the conventional sense to

> describe a joint between two surfaces and thus excludes unbonded surfaces clamped together with a mechanical structure. As explained in the '456 patent . . . . From the foregoing, it is clear that the '456 patent uses the term "bonding" or "bonded" to refer to a joint or "bond" between opposing surfaces rather than unbonded surfaces clamped together with a mechanical structure.

Docket No. 265, Exh. 2 at 24, 26 of 120. Thus, Lam excluded from bonding, clamping with a mechanical structure, but it did not limit bonding to soldering, brazing, and adhesive joints.

b. Claims and Specification

The parties agree that "[s]hrink fitting utilizes thermal expansion and then contraction of material to mate two parts that would otherwise interfere with each other at their normal temperature." Glew Decl. ¶ 10. In particular, shrink fitting requires thermal expansion and does not require bonding material or a bonding layer to mate the two parts. *See* Lin Decl. (Docket No. 288) ¶ 12. The parts are held together by compression.

i. The Abstract and Summary of the Invention

The Abstract of the '266 Patent provides:

> An electrode assembly for a plasma reactor . . . comprises an electrode plate having a support frame attached to one surface thereof. . . . The support frame is bonded to the electrode plate using a bonding layer, usually a ductile metallic bonding layer, which provides effective thermal and electrical coupling while permitting a degree of thermal expansion mismatch between the support frame and the electrode plate.

Thus, the Abstract requires the support frame and electrode plate to be bonded using a bonding layer. The Summary of the Invention, while not express, also assumes use of a bonding layer:

> According to the present invention, an electrode assembly suitable for use in a parallel plate plasma reactor comprises a plate, usually in the form of a disk, composed of . . . . One face of the plate is bonded to a support frame composed of . . . . Preferably, a plate and support frame are bonded together with a relatively ductile bonding layer formed by brazing, soldering, or the like. The bonding material should be composed of a thermally and electrically conductive material, such as metals, conductive epoxies or the like . . .

'266 Patent col. 2:29-43. Since shrink fitting does not require bonding materials or a bonding layer, the Abstract and Summary tends to show that shrink fitting is excluded from the bonding contemplated by the '266 Patent.

Significantly, the Abstract and Summary of Invention is entitled to greater consideration in claims construction than a preferred embodiment, particularly where it is clear the preferred embodiment is meant to be merely illustrative. *See Genzyme Corp. v. Transkaryotic Therapies, Inc.*, 345 F.3d 1094, 1099 (Fed. Cir. 2003) (holding that the specification limited the scope of a term to a particular technique, noting: "the 'Summary of the Invention' explicitly states that the 'present invention,' not merely a preferred embodiment involves the [technique].")]

ii. Thermal Expansion in the Specification Requires a Bonding Layer

Lam argues that other language of the specification describes shrink fit, in particular:

> In forming the electrode assembly 10, it will be desirable to "pre-stress" the support ring 14 so that it provides a radially directed inward compression on the electrode plate 12. Such a compressive stress helps to inhibit stress fracturing of the electrode plate during use. More specifically, by utilizing a support ring 14 which is formed from a material that has a slightly *larger thermal expansion coefficient than that of the electrode plate, and forming or curing the bonding layer* at a temperature above the expected operating temperature, the support ring will apply a constant compressive force on both the electrode plate and the bonding layer. Even when the temperature of the electrode assembly is raised from room temperature to the operation temperature, the support ring will still be in compression (although reduced relative to room temperature). Thus thermal cycling will be less likely to fracture the electrode plate which is fragile relative to the support ring.

'266 Patent 6:53-58 (emphasis added). This contains the statement (✻) ("More specifically, . . . ") discussed earlier. Pointing to the difference in thermal expansion coefficients in (✻), Lam argues that the compressive force exerted by the support ring on the electrode plate is achieved by shrink fit. Glew Decl. ¶ 17. However, the description in (✻) entails *two* conditions, (1) forming the support ring "from a material that has a slightly larger thermal expansion coefficient than that of the electrode plate" and (2) "forming or curing the bonding layer at a temperature above the expected operating temperature." Lam relies on the first condition but completely disregards the second. Because (✻) requires a bonding layer, and shrink fit does not, (✻) does not disclose shrink fit.

Further, each time thermal expansion – which is necessary for shrink fit – is mentioned in the '266 Patent, a "bonding layer" is present. A search for the term "expansion" in the Patent yields the following passages:

- The support frame is bonded to the electrode plate using a bonding layer, usually a ductile metallic bonding layer, which provides effective thermal and electrical coupling while permitting a degree of thermal expansion mismatch between the support frame and the electrode plate. '266 Patent, Abstract.

- The material of the support frame will usually be chosen to have a thermal expansion coefficient which is generally compatible with that of the electrode plate, but a certain amount of mismatch can be tolerated when the bonding layer is formed from a ductile material. In a preferred embodiment, the support frame is chosen to have a slightly greater coefficient of thermal expansion. By then joining and/or curing the bonding layer at a temperature above the expected operating temperature of the electrode, the electrode plate will be maintained under compression, enhancing the durability of the plate. '266 Patent col. 2:65 - 3:8.

- Soldering is a less expensive process and is particularly suitable for joining materials which have a large mismatch in their coefficients of thermal expansion. The relatively low solidification temperature of soldered materials minimizes the expansion mismatch at the solidification temperature. Brazing will usually provide a higher strength bond, but is suitable only for materials which have well matched thermal expansion coefficients in order to avoid high stresses in the bonding layer and electrode plate after cooling to room temperature. *Id*. col. 6:13-22.

- Typically, bonding will be performed by either brazing, soldering, or use of adhesives to form a ductile bonding layer. The ductility is desirable so that any thermal expansion mismatch between the electrode plate 12 and support ring 14 will not result in breaking or of the bond, or the electrode plate. *Id*. col. 5:58-62.

- More specifically, by utilizing a support ring 14 which is formed from a material which has a slightly larger thermal expansion coefficient than that of the electrode plate, and forming or curing the bonding layer at a temperature above the expected operating temperature, the support ring will apply a constant compressive force on both the electrode plate and the bonding layer. *Id*. col. 6:52-58.

- Claim 33.

The first five passages do not disclose shrink fitting because a bonding layer is present. Claim 33 is discussed below.

In addition, the figures in the Patent suggest bonding excludes shrink fitting. The figures show both the electrode plate and support ring to be completely flat, without any structural component that would allow mating with the support frame through shrink fitting. The two components are connected along the flat area in which they come into contact.

Thus, the specification does not disclose shrink fitting.

iii. Claims 32 and 33 Require a Bonding Layer

Lam asserts that Claim 32 discloses shrink fitting. Claim 32 reads (emphasis added):

> An electrode assembly as in claim 18, wherein the support ring is *pre-stressed* to impart a radially inward compression on the electrode disk.

As discussed above, pre-stress of the support ring is described in the specification in (✻). It requires (1) forming the support ring "from a material that has a slightly larger thermal expansion coefficient than that of the electrode plate" and (2) "forming or curing the bonding layer at a temperature above the expected operating temperature," so that "the support ring will apply a constant compressive force on both the electrode plate and the bonding layer." '266 Patent 6:52-58. As above, because shrink fit does not require a bonding layer whereas Claim 32 does (via the definition of "pre-stressed"), Claim 32 does not disclose shrink fit.

Lam asserts that Claim 33 discloses shrink fitting. Claim 33 reads:

> A method for forming an electrode assembly including a support ring and an electrode plate, said method comprising:
>
> bonding the support ring about the periphery of the electrode plate at elevated temperature, wherein the material of the support ring has a higher coefficient of thermal expansion than that of the electrode plate; and
>
> allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress.

Lam asserts that "Claim 33 describes a method for integrating the support ring and the electrode plate by shrink fitting alone," "with the shrink fitting described therein being the only disclosed way of integrating the components." Lam Opening Br. at 17. Lam argues that "the desired stress, as used in Claim 33, is the compressive stress that is required to form the electrode assembly by shrink fitting." Docket No. 274 (Glew Decl.) ¶ 18. Lam relies on the "pre-stress" mentioned in Claim 32 and the "radially directed inward compression" of (✻). However, as already discussed, the pre-stress mentioned in Claim 32 and (✻) entail a bonding layer, and thus does not result from shrink fit.

Contrary to Lam's assertion, the Claim 32 and the specification indicate that the "desired stress" is pre-stress, not the compressive stress necessary for shrink fit. From Claim 33 alone, it is unclear what "desired stress" is. However, viewed in context, it is evident that desired stress in Claim 33 pertains to pre-stress. Looking to the specification and other claims, the word "stress" occurs six times, as indicated in bold: col. 4:30-34 ("The geometry of the electrode plate will

generally be symmetric and relatively simple in order to enhance uniform electrical and thermal characteristics as well as minimize **stress**es which might occur during machining, mounting, and/or use of the electrode."); col. 6:20-22 ("Brazing will usually provide a higher strength bond, but is suitable only for materials which have well matched thermal expansion coefficients in order to avoid high **stress**es in the bonding layer and electrode plate after cooling to room temperature."); col. 6:48-52 ("In forming the electrode assembly 10, it will be desirable to 'pre-**stress**' the support ring 14 so that it provides a radially-directed inward compression on the electrode plate 12. Such a compressive **stress** helps to inhibit **stress** fracturing of the electrode plate during use."); and Claim 32 ("An electrode assembly as in claim 18, wherein the support ring is pre-**stress**ed to impart a radially inward compression."). The first two occurrences describe undesirable stress, and therefore, are not relevant to the "desired stress" in Claim 33. The last four occurrences pertain to "pre-stress." In short, the specification and other claims indicate that the "desired stress" in Claim 33 refers to pre-stress.

The prosecution history also shows that the "desired stress" is pre-stress. The Examiner had rejected Claim 33 as unpatentable over Shigeru (in view of Yamada), on the grounds that "Shigeru teaches bonding the backing plate to an electrode plate . . . wherein the material of the electrode plate (Cu) has a higher coefficient of thermal expansion than that of the electrode plate (silicon dioxide); and allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress." Docket No. 265 Exh. 1 at 12-13 of 16. In response, Lam objected on the grounds that it, not Shigeru, had disclosed "desired stress," and explained "desired stress" as follows:

> In the Official Action, Shigeru is cited for disclosure of differential contraction allegedly imparting the "desired stress." However, nowhere in Shigeru is the phrase "*desired stress*" mentioned. The *only source of this concept is from Appellants' disclosure*. . . . Thus there is no basis to conclude that a *pre-stress would be produced or desired* in the Shigeru arrangement.

Docket No. 265 Exh. 2 at 105-06 of 120 (emphasis added) (references omitted). Lam thus pointed to the disclosure for the meaning of "desired stress," and equated it with pre-stress.

In short, Claim 33 does not disclose shrink fit, because the compressive force it discloses is pre-stress, which entails bonding material to bond the support ring to the electrode plate, not shrink fitting.

iv. Claim Differentiation

"[A] claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed." 35 U.S.C. § 112(d). "'[C]laim differentiation' refers to the presumption that an independent claim should not be construed as requiring a limitation added by a dependent claim." *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380 (Fed. Cir. 2006) (citations omitted). "[R]eading an additional limitation from a dependent claim into an independent claim would not only make that additional limitation superfluous, it might render the dependent claim invalid." *Id.*

Claim 1 claims "a support frame . . . bonded to a back face of the plate." Claim 10 claims "[a]n improved reactor as in claim 1, wherein the plate is bonded to the support frame by means of a bonding layer." Under the doctrine of claim differentiation, the presumption would be that a bonding layer is not always necessary for bonding under Claim 1. This does not imply, however, that bonding encompasses shrink fitting. First, there are bonding methods other than shrink fitting that do not require bonding layers. The parties agreed during the hearing that welding is a form of metallurgical bonding that does not require a bonding layer (as is mechanical clamping, which Lam disclaimed after the '456 Patent issued). *See also*, Docket No. 265 Exh. 2 at 27 of 120 (Lam stating that bonding may encompass diffusion bonding). Second, shrink fitting entails thermal expansion, and as discussed above, whenever thermal expansion is mentioned in the '266 Patent, a bonding layer is present.

The Court also takes note that, despite Lam's conclusion that shrink fit has been well known and used for "decades," the '266 fails to mention it as a suitable bonding method either in the claims or specifications. Such an omission would be curious if the '266 were intended to encompass such well-known and utilized technology.

The Court further notes that Claim 33's requirement that "the materials of the support ring has a higher coefficient of thermal expansion than that of the electrode plate" is not necessary for

shrink fit. As Xycarb has pointed out, shrink fit can be accomplished by heating only the support ring before fitting it over the compression points of the electrode plate and letting it cool. To accomplish shrink fit, there is no need for a differential coefficient of thermal expansion between the support ring and electrode plate. Indeed, if shrink fit were used where the support ring has a higher coefficient than the electrode plate, as operating temperatures increase, the grip or compressive force of the shrink fit would diminish; it is hard to understand why this would be a desirable result.

In summary, the claims and specification exclude shrink fitting from bonding.

c. Extrinsic Evidence

The extrinsic evidence also tends to show "bonded' excludes shrink fit. *See* Xycarb's Responsive Claim Construction Brief at 3-4. In 1995, five years after the '456 Patent had been issued, Lam was providing IBM with electrode assemblies where the electrode plate was metallurgically bonded to a support frame by soldering with indium. Docket No. 287 Exh. 2 (Maddock Decl. attached to Tam Decl.) ¶ 7; Docket No. 273 Exh. E (van den Cruijsem Decl. attached to Clark Decl.) ¶ 28. Lam found that "metallurgical bonds such as [indium] bonds cause the electrode to warp due to differential thermal expansion/contraction of the electrode the part to which the electrode is bonded," and that "metallurgical bonds fail at high plasma processing powers due to thermal fatigue and/or melting of the bond." Docket No. 273 Exh. K (Lam's '577 Patent) 1:27-33. IBM experienced problems with the Lam electrode, such as "delamination, contamination, [and] particle generation," and contacted Xycarb to request an improved version of Lam's electrode. Docket No. 273 Exh. E (van den Cruijsem Decl. attached to Clark Decl.) ¶ 28. Xycarb began investigating a method to integrate the electrode and support frame without bonding materials, to avoid infringing the '456 Patent, and approximately one year later, had the shrink fit concept. Docket No. 82 (van den Cruijsem Decl.) ¶¶ 7-8. This evidence tends to show that a person skilled in the art would not understand from the '266 Patent that the bonding could be achieved by shrink fit.

Further, Lam's '577 Patent (2000) describes the '456 Patent as follows: "The '456 patent discloses an electrode assembly for a parallel plate reactor apparatus wherein the upper electrode is of semiconductor purity and bonded to a support frame by adhesive, solder, or brazing layer."

Docket No. 273-K (Lam '577 Patent) 1:19-22. Thus, Lam's own description of the '266 Patent tends to show "bonded" in the '266 Patent does not include shrink fit.

d. Conclusion

The prosecution history shows that Lam disclaimed clamping with a mechanical structure. The claims, specification, and extrinsic evidence show that bonding does not include shrink fitting. Thus, the Court excludes from "bonded" connections maintained solely by mechanical force.

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4. Term 7: "higher coefficient of thermal expansion," "differential contraction," and "desired stress"

Lam	Xycarb	Court
• Coefficient of thermal expansion, as used in this claim element, means a coefficient, expressed as a value per degree Kelvin, that describes the change in volume of a material per change in unit temperature. The value of the coefficient of thermal expansion for the material of the support ring is higher than the value of the coefficient of thermal expansion of the material of the electrode plate. • Differential contraction means the differing rates at which the volume of the support ring and electrode plate contract when returning to room temperature. • Desired stress is the compressive stress that is required to form the electrode assembly in Claim 33 by shrink fitting.	The material used in the support ring, when subjected to an increase in temperature, will have a greater relative expansion than the material used to form the electrode plate when subjected to the same increase in temperature, such that, when the support ring and electrode plate are cooled to room temperature, the support ring will have a greater relative contraction than the electrode plate, thus creating a compressive force across the electrode plate. "Desired stress" is indefinite, or defined as in the above.	• Coefficient of thermal expansion describes the change in volume of a material per unit change in temperature, commonly measured in parts per million per degree celsius. The coefficient of thermal expansion for the material of the support ring is greater than the coefficient of thermal expansion of the material for the electrode plate. • Differential contraction means the differing rates at which the volume of the support ring and electrode plate contract when returning to room temperature. • Desired stress is the compressive stress resulting from pre-stress.

These terms appear only in Claim 33.

a. "desired stress"

Xycarb asserts that the term "desired stress" is indefinite because the type and amount of stress is not defined. It asserts that, consequently, Claim 33 is invalid.

i. Legal Standard

The requirement that a claim be "definite" derives from 35 U.S.C. § 112, ¶ 2.

> 35 U.S.C. § 112, ¶ 2 requires that the specification of a patent "conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." Because claims delineate the patentee's right to exclude, the patent statute requires that the scope of the claims be sufficiently definite to inform the public of the bounds of the protected invention, *i.e.*, what subject matter is covered by the exclusive rights

> of the patent. Otherwise, competitors cannot avoid infringement, defeating the public notice function of patent claims.

Halliburton Energy Servs., Inc. v. M-I LLC, 514 F.3d 1244, 1249 (Fed. Cir. 2008) (citations omitted). On the other hand,

> claims are not indefinite merely because they present a difficult task of claim construction. Instead, "[i]f the meaning of the claim is discernible, even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree, we have held the claim sufficiently clear to avoid invalidity on indefiniteness grounds." Proof of indefiniteness requires such an exacting standard because claim construction often poses a difficult task over which "expert witnesses, trial courts, and even the judges of this court may disagree." Nevertheless, this standard is met where an accused infringer shows by clear and convincing evidence that a skilled artisan could not discern the boundaries of the claim based on the claim language, the specification, and the prosecution history, as well as her knowledge of the relevant art area. . . . "Only claims 'not a amenable to construction' or 'insolubly ambiguous' are indefinite."

Id. at 1249-50 (quoting *Exxon Research & Eng'g Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001); *Datamize, LLC v. Plumtree Software, Inc*., 417 F.3d 1342, 1347 (Fed. Cir. 2005)).

ii. Application

The type of stress is not indefinite. As discussed above, the "desired stress" is pre-stress. The question is whether ambiguity as to the amount, or more precisely, the range of permissible pre-stress, renders "desired stress" indefinite. The Court finds it does not. As discussed above, the specification describes pre-stress as follows:

> In forming the electrode assembly 10, it will be desirable to "pre-stress" the support ring 14 so that it provides a radially directed inward compression on the electrode plate 12. Such a compressive stress helps to inhibit stress of the electrode plate during use. More specifically, by utilizing a support ring 14 which is formed from a material that has a slightly larger thermal expansion coefficient than that of the electrode plate, and forming or curing the bonding layer at a temperature above the expected operating temperature, the support ring will apply a constant compressive force on both the electrode plate and the bonding layer.

'266 Patent col. 6:48-58. Obviously, the "thermal expansion mismatch between the electrode plate and support ring" should not be so high as to "result in breaking or fracturing of the bond or the electrode plate." *Id.* at 5:59-62.

The Court notes that it would be difficult to specifically quantify the range of the desired stress, since it depends on various parameters, such as the bonding material, the ductility of the bonding layer, the difference in thermal expansion coefficients, the material of the electrode plate, and changes in temperature. The specification provides one concrete example: soldering with indium at a temperature of about 310° F. to 320° F, tolerates a "large mismatch" in thermal expansion coefficients. *Id*. at col. 6:12-16. Other materials may have different tolerances. On the other hand, the strength of the compressive force created by pre-stress can be calculated in terms of the difference in thermal expansion coefficients and temperature. *See* Lin Decl. at 8; Glew Decl. ¶ 13. Then, depending on how brittle the electrode plate and how ductile the bonding layer are, a permissible range of pre-stress can be determined.

Thus, "desired stress" is not "insolubly ambiguous." Xycarb has not shown that the described stress sufficient to perform the compressive function but not so excessive as to cause the plate to warp or fracture cannot be calculated by those knowledgeable in the field.

b. "higher coefficient of thermal expansion"

The expert opinions of both parties show that the "coefficient of thermal expansion" is a well-established concept. The Court's definition is based on Glew's testimony. Docket No. 274 ¶ 12. ("Coefficient of thermal expansion describes the change in volume of a material per unit change in temperature, commonly measured in parts per million per degree Kelvin. The CTE is commonly measured in metric units of parts per million (PPM) per degree ^{o}C, or ^{o}K if one prefers.")

Xycarb inexplicably objects to Lam's definition on the grounds that "nowhere in the specification" is the "coefficient of thermal expansion" defined. The definition of a well-established concept need not be based on only the specification. Moreover, Xycarb does not substantively object to Lam's construction.

c. "differential contraction"

The Court adopts Lam's proposed construction. Xycarb again objects that this definition does not appear in the specification. However, there is no dispute and little doubt what the term means, and Lam's proposed construction adequately captures the meaning.

5. Term 1: "having substantially uniform thickness"

Lam	Xycarb	Court
Plain and ordinary meaning.	A generally flat electrode plate that is of substantially the same thickness from the center to the edge of the plate.	having substantially the same thickness from the center to the edge of the plate

Lam asserts that the Court need not construe Term 1 because it has been rendered moot by Xycarb's admission that the plate it uses has "substantially uniform thickness." Van den Cruijsem (who is an employee of Xycarb and Business Manager of Schunk Semiconductors, which wholly owns and controls Xycarb, *see* Docket No. 273 Exh. E (van den Cruijsem Decl.) ¶ 1, admits that Xycarb's electrode plate is substantially uniform in thickness as the term is used in the '456 Patent. Docket No. 273 Exh. F (van den Cruijsem deposition) at 12 of 14. Lam asserts that this admission renders the term undisputed.

"When there is no dispute as to the meaning of a term that could affect the disputed issues of the litigation, 'construction' may not be necessary." *Hakim v. Cannon Avent Grp., PLC*, 479 F.3d 1313, 1318-19 (Fed. Cir. 2007). This does not mean that courts must not construe undisputed terms, and the cases Lam cites do not so hold. *E.g.*, *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1311 (Fed. Cir. 2005) ("Terms not used in claims in controversy on appeal *need not be* construed.") (emphasis added).

The Court will construe the term to add clarity. Lam objects to Xycarb's definition on the grounds that "generally flat" and "the same thickness from the center to the edge of the plate" "simply restate[] the plain and ordinary meaning of 'uniform.'" In other words, it does not disagree that "the same thickness from the center to the edge of the plate" coincides with the plain and ordinary meaning of "uniform." Since "the same thickness from the center to the edge of the plate" is more concrete than simply "uniform," the Court adopts this formulation. The phrase "generally flat" Xycarb seeks to insert adds little additional meaning.

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6. Term 2: "face of the plate" and "face of the disk"

Lam	Xycarb	Court
Plain and ordinary meaning	Flat, outermost surface of the electrode plate or disk	Plain and ordinary meaning

The terms appear in Claims 1 and 18, where the "back face of the plate" is attached to the support ring, and the "front face of the plate" is exposed to the other electrode. The meanings of "face of the plate" and "face of the disk" are clear. The surface of the electrode disk is composed of top and bottom faces in the form of disks ("disk" in the 2-dimensional sense) and a side in the form of a cylinder. The terms refer to the top and bottom faces.

Xycarb's definition is confusing. It is unclear what "outermost" is. Further, inserting "flat" gives the impression that the plate or disk is perfectly flat, but this may not be. Claim 18 speaks of "substantially flat and free from protuberances" and "an electrode disk . . . having a substantially uniform thickness." '266 Patent col. 9:28-32.

The plain and ordinary meaning should be used.

7. Term 3: "electrode plate comprises a disk" and "electrode disk"

This term is no longer disputed. The parties agree that the plain and ordinary meaning should be used. *See* Xycarb's Response Br. at 25.

8. Term 4: "about the periphery"

Lam	Xycarb	Court
Plain and ordinary meaning	At or coincident with the outermost edge of the electrode plate or disk	about the periphery, for example, as illustrated in Figure 2A

The term appears in Claims 5, 18, 33, respectively, as follows: "secured *about the periphery* of the disk," "bonded *about the periphery* of one face of the disk," and "bonding the support *about the periphery* of the electrode plate."

Lam cites the Merriam-Webster Dictionary, stating that "periphery" means "'the outward bounds of something as distinguished from its internal regions or center.'" Lam's Opening Br. at 16.

It adds that Figure 2A illustrates "outward boundary." *Id*. The Court agrees with Lam that the plain and ordinary meaning is adequate. The Court adds the reference to Figure 2A for concreteness.

Xycarb's proposed definition adds more confusion than clarity. It is unclear what "at or coincident with the outermost edge" means.

9. Term 5: "region of bonding"

Lam	Xycarb	Court
Plain and ordinary meaning	The contact area between a flat, outermost surface or face on the back of the electrode plate	Plain and ordinary meaning

The plain and ordinary meaning is adequate. Xycarb's "flat, outermost surface" is unclear for the reasons stated above and "on the back of the electrode plate" is redundant.

This order disposes of Docket Nos. 264 and 278.

IT IS SO ORDERED.

Dated: April 7, 2014

EDWARD M. CHEN
United States District Judge