

No. 16-

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IN THE  
**Supreme Court of the United States**

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IN RE: CELGARD, LLC,

*Petitioner.*

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ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED  
STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

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**PETITION FOR A WRIT OF CERTIORARI**

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## QUESTIONS PRESENTED

- 1) Whether *inter partes* review—an adversarial process used by the Patent and Trademark Office (“Patent Office”) to analyze the validity of existing patents—violates the Constitution by extinguishing private property rights through a non-Article III forum without a jury?
- 2) Whether the Federal Circuit’s issuance of Rule 36 judgments without opinions for the disposition of appeals from the Patent Office violates 35 U.S.C. § 144’s requirement that the Federal Circuit “shall issue” its “mandate and opinion” for such appeals?
- 3) Whether the Federal Circuit’s pervasive practice of issuing Rule 36 judgments without opinions to affirm more than 50% of appeals from the Patent Office has exceeded the bounds of reasonableness and is inconsistent with “principles of right and justice”?
- 4) Whether the Patent Office’s consistent practice of failing to consider the claimed invention “as a whole” and failing to consider whether the combination of elements would lead to “anticipated success” in an obviousness determination conflicts with 35 U.S.C. § 103 and this Court’s precedent in *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007)?

## **PARTIES TO THE PROCEEDINGS**

There are no parties to this proceeding other than petitioner, Celgard, LLC. LG Chem, Ltd. was a party in the proceeding at the Patent Office. Celgard, LLC and LG Chem, Ltd. settled their dispute during the pendency of the appeal before the Federal Circuit, and, as a result, LG Chem, Ltd. is no longer a party in this proceeding. LG Chem, Ltd. did not participate in any of the briefing or appeal proceedings before the Federal Circuit. The Patent Office via Michelle Lee, Director, United States Patent and Trademark Office, intervened at the Federal Circuit.

**CORPORATE DISCLOSURE STATEMENT**

Petitioner Celgard, LLC is indirectly owned by Asahi Kasei Corp. through the following entities: Asahi Kasei Energy Storage Materials, Inc. and Polypore International, LP. No publicly held company owns 10% or more of Celgard, LLC's stock.

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Petitioner Celgard, LLC (“Celgard”) respectfully petitions this Court for a writ of certiorari to review the judgment of the United States Court of Appeals for the Federal Circuit in this case.

### **OPINIONS BELOW**

The Federal Circuit did not issue an opinion in this case. Instead, it issued a “Notice of Entry of Judgment Without Opinion” pursuant to Federal Circuit Rule 36 (App. 1a-2a), which is unreported and available at 671 Fed. Appx. 797 (Fed. Cir. Dec. 13, 2016). The Federal Circuit denied Celgard’s petition for panel rehearing and rehearing *en banc* (App. 63a-64a), which is unreported. The opinion and order of the Patent Trial and Appeal Board (“Patent Office”) are unreported (App. 3a-62a).

### **JURISDICTION**

The Federal Circuit entered its judgment on December 13, 2016, and denied panel rehearing and rehearing *en banc* on February 17, 2017. Celgard filed an application to extend the time to file this petition for a writ of certiorari, which was granted on May 2, 2017, making the petition due on or before June 19, 2017. This Court’s jurisdiction is invoked under 28 U.S.C. § 1254(1).

### **STATUTES AND RULE INVOLVED**

This case involves the Federal Circuit’s failure to follow 35 U.S.C. § 144 and the conflict between this statute and Federal Circuit Rule 36.



35 U.S.C. § 144 provides:

The United States Court of Appeals for the Federal Circuit shall review the decision from which an appeal is taken on the record before the Patent and Trademark Office. Upon its determination the court shall issue to the Director its mandate and opinion, which shall be entered of record in the Patent and Trademark Office and shall govern the further proceedings in the case.

FED. CIR. R. 36 reads:

Rule 36. Entry of Judgment – Judgment of Affirmance Without Opinion

The court may enter a judgment of affirmance without opinion, citing this rule, when it determines that any of the following conditions exist and an opinion would have no precedential value:

- (a) the judgment, decision, or order of the trial court appealed from is based on findings that are not clearly erroneous;
- (b) the evidence supporting the jury's verdict is sufficient;
- (c) the record supports summary judgment, directed verdict, or judgment on the pleadings;

(d) the decision of an administrative agency warrants affirmance under the standard of review in the statute authorizing the petition for review; or

(e) a judgment or decision has been entered without an error of law.

This case also involves the Federal Circuit's failure to follow 35 U.S.C. § 103 that provides:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

## INTRODUCTION

On June 12, 2017, this Court granted certiorari in *Oil States Energy Services LLC v. Greene's Energy Group, LLC* to consider the issue of “[w]hether *inter partes* review, an adversarial process used by the Patent and Trademark Office (PTO) to analyze the validity of existing patents, violates the Constitution by extinguishing private property rights through a non-Article III forum without a jury.” 16-00712 QP Report; *Oil States Energy Servs.*,

*LLC v. Greene's Energy Grp., LLC*, No. 16-712, 2017 U.S. LEXIS 3727, at \*1 (June 12, 2017). This petition presents the identical question. This is an appeal from an *inter partes* review, in which the Patent Office held Celgard's patent invalid. Thus, at a minimum, this Court should hold this petition pending the outcome of *Oil States*. If the Court determines in *Oil States* that *inter partes* review proceedings are unconstitutional, it should grant this petition, vacate the decision below and remand for further consideration.

This case also implicates a fundamental and widespread problem occurring at the Federal Circuit—the pervasive issuance of judgments without opinions pursuant to Federal Circuit Rule 36 (hereinafter “Rule 36 judgments”) to dispose of important patent appeals, such as the one in this case. Since the creation of *inter partes* review proceedings in 2012 to challenge a patent's validity at the Patent Office, the rate at which the Federal Circuit has issued Rule 36 judgments has dramatically increased. In 2016, the Federal Circuit issued Rule 36 judgments in *more than 50%* of appeals from the Patent Office (and more than 40% of appeals overall).

The staggering rate at which the Federal Circuit issues Rule 36 judgments is particularly concerning to the patent community. Numerous commentators and scholars have compiled statistics and have written articles on this issue. Indeed, over 20 petitions of writ of certiorari to this Court have raised the issue of the impropriety of the Federal Circuit's Rule 36 judgments. Many of these petitions have argued that the Federal Circuit's liberal practice of issuing Rule 36 judgments is problematic because it effectively eliminates a litigant's right to appeal

and does not comport with due process. Few petitions have argued, as this petition does, however, that this practice is statutorily prohibited under 35 U.S.C. § 144.

Section 144 of Title 35 requires that the Federal Circuit issue a “mandate *and opinion*” for decisions on appeals from the Patent Office. 35 U.S.C. § 144 (emphasis added). The plain language of this statute is clear: the Federal Circuit must issue opinions for Patent Office appeals. A Rule 36 judgment, by its definition, is a “judgment of affirmance *without opinion*.” FED. CIR. R. 36 (emphasis added). Accordingly, the Federal Circuit’s issuance of Rule 36 judgments to dispose of appeals from the Patent Office violates 35 U.S.C. § 144’s express requirement that the Federal Circuit issue opinions for such appeals.

In addition to being prohibited statutorily, the Federal Circuit’s issuance of Rule 36 judgments in over 50% of appeals from the Patent Office exceeds any measure of reasonableness. The Federal Circuit stands alone among the circuit courts in its rate of issuing judgments without opinions. In fact, six circuit courts *prohibit* disposing of appeals without opinions. This includes the Ninth Circuit, which has ten times as many appeals to consider as the Federal Circuit. And in those circuit courts that permit judgments without opinions, none issue them as frequently as the Federal Circuit. The Federal Circuit is unique in its ubiquitous use of judgments without opinion. This Court has routinely rejected attempts by the Federal Circuit to invoke a practice that is unique among the circuit courts.

The Federal Circuit’s high rate of Rule 36 judgments without opinions also fails to comport with this Court’s requirement that the local rules be consistent with “the

principles of right and justice” (*Frazier v. Heebe*, 482 U.S. 641, 645 (1987))—namely the right under the Constitution for an inventor to secure for a limited time the exclusivity of her invention. Further, Rule 36 judgments cannot advance uniformity in patent law, which was the central purpose for the creation of the Federal Circuit. Finally, litigants are left without direction and clarity as to their appeal. That is particularly concerning in cases, such as this case, where the standard of review is *de novo*. This case presents an opportunity for this Court to clarify the scope and appropriateness of the Federal Circuit’s issuance of Rule 36 judgments without opinions.

This case also presents the opportunity to clarify the correct standard for applying the law of obviousness. The Patent Office has a consistent practice of failing to consider the claimed invention “as a whole” in violation of 35 U.S.C. § 103 and failing to consider whether the combination of elements would lead to “anticipated success,” as instructed in *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). This practice has resulted in important and revolutionary patents, such as the one in this case, being held invalid.

This case demonstrates how failing to follow statutory language and this Court’s precedent on obviousness results in an improper obviousness determination. Celgard’s patent is directed to a safer and now widely-used ceramic coated battery separator used in lithium batteries for consumer electronics, energy storage, and electric vehicles. Lithium batteries present unique safety challenges such as the phenomenon known as lithium dendrite growth—the irregular growth of a metal on an electrode during charging that can lead to a hard short and catastrophic battery failure. Celgard solved

the problem of dendrite growth and thermal runaway by creating a unique two-layer battery separator. One layer is a ceramic composite layer with inorganic particles in a matrix material that blocks dendrite growth. The other layer shuts down ionic flow in the event of thermal runaway. This patented separator solved an important safety issue and resulted in enormous success in the marketplace. By some accounts, Celgard's patented separator paved the way for modern lithium batteries and electric vehicles, and about 20% or more of the world's lithium batteries (and 70% of electric vehicles) include the patented separator. The validity of Celgard's patent was challenged at the Patent Office six times, and the Patent Office ultimately concluded in only one of the *inter partes* reviews that claims 1-6 and 11 of the claimed invention were unpatentable as obvious over the combination of two references. In its decision, the Patent Office focused on whether the individual elements of the claimed invention were present in the prior art.

The Patent Office did not consider whether the "differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious" as required under 35 U.S.C. § 103. The Patent Office also did not consider whether the combination of elements would have resulted in "anticipated success," as instructed under *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) to avoid hindsight in an obviousness determination. *Id.* Had the Patent Office considered these important aspects of obviousness, it would have found that the combination of elements from the prior art references would have resulted in an inoperable battery and the objective indicia of nonobviousness, such as industry praise, commercial success, long-felt but unresolved

need and copying by others, were strong evidence of the nonobviousness of the claimed invention.

The Patent Office failed to follow the appropriate obviousness analysis for assessing inventions comprised of a combination of elements that only individually exist in the prior art. This reflects a trend where by failing to consider the obviousness under the statute and this Court's instruction in *KSR*, the Patent Office has been improperly invalidating important and revolutionary patents, such as the one in this case. This Court must step in to clarify the appropriate standard for assessing obviousness to prevent this patent, and future pioneering patents, from being wrongfully invalidated.

## STATEMENT OF THE CASE

### A. Background on Celgard

Petitioner Celgard, LLC (“Celgard”), headquartered in North Carolina, is a global leader in the development and production of specialty microporous membranes, including separators used in lithium batteries, such as secondary or rechargeable lithium ion batteries, for consumer electronics devices, energy-storage systems, and electric vehicles. Celgard makes separator products, including ceramic coated separators, in North Carolina, and ships them around the world.

Among Celgard's innovative separator technologies is U.S. Patent No. 6,432,586 (“the '586 patent”), titled “Separator for a High Energy Rechargeable Lithium Battery.” Lithium batteries present certain unique safety issues due to their chemical design and composition. One

such safety issue is the phenomenon known as lithium dendrite growth. Dendrite growth refers to the irregular growth of a metal on an electrode during battery charging and storage. A253-255; A324-335. During repeated battery use, dendrite growth can cause catastrophic failure of a lithium battery. A254; A330-333. Indeed, the majority of battery failures and thermal runaways of lithium batteries are caused by dendrite growth during battery operation.

The battery industry has long identified dendrite growth and associated electronic shorting as a significant safety issue. A255-257; A332-340. In 2000, one of the world's leading lithium battery scientists, Dr. Zhengming Zhang, invented the separator technology described and claimed in the '586 patent to address the dendrite growth problem in lithium batteries as well as safety issues related to thermal runaway and shorts. A255-257; A055 (1:17-35). Dr. Zhang's unique separator is a two-layer separator with (1) a ceramic composite layer (or coating) including a mixture of inorganic particles and a matrix material, and (2) a polyolefinic microporous layer (or shut down layer). A055 (1:44-54). The ceramic composite layer combines inorganic particles within a matrix material, and the layer blocks dendrite growth and prevents electronic shorts. This patented separator eliminated the dendrite growth problem and, as a result, experienced enormous commercial success. A338-340; A381-383; A666-668. Indeed, the industry-wide problem of battery failure due to dendrite growth was addressed by the '586 patent.

Before Celgard's invention, no one had thought to use ceramic coated separators in lithium batteries to block dendrite growth. A295-296. Prior unsuccessful solutions



relied upon the thickness of the separator—rather than a ceramic coated layer—to attempt to block dendrite growth. A296. After Celgard’s invention, the industry adopted ceramic coated separators. A300. Indeed, much of the plug-in electric vehicle market has adopted ceramic coated separator technology; 70% of electric vehicles use ceramic coated separators. *Id.* And over 50 patents and numerous articles cite to this revolutionary patent. In the lithium battery industry, Dr. Zhang has become a world leader in battery safety and in establishing lithium battery safety standards. Celgard’s patented two-layer ceramic coated separator was ground-breaking technology and vastly improved the safety of lithium batteries.

## **B. Procedural History of the Case and the Patent Office’s Decision**

LG Chem<sup>1</sup> filed a petition for *inter partes* review at the Patent Office, challenging the validity of the ’586 patent. The Patent Office instituted review,<sup>2</sup> and its final decision concluded that LG Chem had shown by a preponderance of

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1. During the appeal at the Federal Circuit, the parties settled their dispute. Thus, LG Chem did not participate in that appeal. The Patent Office intervened at the Federal Circuit.

2. In its Petition for *inter partes* review, LG Chem alleged that six references rendered invalid all claims of the ’586 patent on three separate grounds. A071-073. The Patent Office rejected all but two of the references presented and rejected two of the three grounds. A210-241. In addition, the ’586 patent was the subject of five other *inter partes* review petitions or proceedings by Sumitomo Chemical, SK Innovation (two separate *inter partes* review petitions), Mitsubishi Plastics, and Ube Maxell; the Patent Office declined to institute two of the petitions for claims 1-6 and 11 (A1086; A1118-1134) and upheld the validity of these claims in a third *inter partes* proceeding (A1028-1084).

the evidence that claims 1-6 and 11 of the '586 patent would have been obvious over a combination of two references—unexamined Japanese Patent Application No. H5-190208 (hereinafter, “Tobishima”) and unexamined Japanese Patent Application No. H11-80395 (hereinafter, “Tojo”).

The Tobishima reference considers the problem of dendrite growth, but proposes a different solution from that of the '586 patent. A204-209. Tobishima's patent application states that it relies upon the thickness of the film to avoid dendrite growth and penetration. A205-206 [0006], [0008]; *see also* A334-335; A368-370. Tobishima's separator does not involve inorganic particles or a ceramic coating; rather it is a thick separator made of two types of polymer film, where the second film is an electrolyte solution impregnated polymer film. A205-206 [0006], [0011]. This second film is soft and gel-like. *Id.* [0006]-[0008]. ; Tobishima's patent application was never examined and did not materialize into a patent. There is no evidence that the separator described in Tobishima's application was ever produced or commercialized or actually worked to block dendrite growth.

The Tojo reference addresses the problem of battery separator tearing caused by electrically conductive particles that break off the electrodes during battery manufacture (winding) and cut through the separator. A191-192 [0005], [0008]. Tojo is not directed to problems (such as dendrite growth) that occur during the use, or repetitive cycling, of a battery cell. Tojo does not mention dendrites. *See* A189-203. Tojo's proposed solution for protecting a separator from being torn by large particles during battery manufacture includes a hard polymer or inorganic microparticle-containing surface protection

layer with holes on at least one of its surfaces. A192 [0008], [0010]. An essential feature of Tojo's surface protection layer is its large open holes. A195 [0025]. These large open holes are critical to the design and operation of Tojo's separator. *Id.* A separator with large holes cannot properly conduct ions and cannot block dendrite growth. A016. The Patent Office acknowledged that Tojo's separator cannot block dendrite growth and determined that Tojo alone could not invalidate the claims. *See* A007-025.

Inconsistently, however, the Patent Office determined that Tojo in combination with Tobishima renders obvious claims 1-6 and 11 of the '586 patent. A012-025. Despite Tojo's disclosure of large open holes that could not serve to block dendrite growth, the Patent Office found that the references included the individual elements of the claims and that each reference's mention of different methods for increasing the strength of its battery separator, which has nothing to do with blocking dendrite growth, was a reason to combine the references and to render the claimed invention obvious. *See* A025-030; A094-105; A285-292; A689-691. In particular, the Patent Office focused on both references' use of the phrase "mechanical strength" to find a reason to combine the references. The Patent Office relied on the words "mechanical strength" despite evidence that the prevention of penetration of large hard particles and the blockage of lithium dendrites are different problems. The prevention of penetration of hard particles is a mechanical behavior. The blockage of dendrite growth is an electrochemical process that has nothing to do with material mechanical hardness. A252-259.

The Patent Office’s discussion on combining the references to achieve the claimed invention was limited to a few conclusory sentences and failed to identify a legally sufficient basis for combining Tobishima and Tojo to achieve the claimed invention. A029. The Patent Office concluded “that an ordinarily skilled artisan would have been prompted to combine Tojo’s inorganic particles in the polymer matrix of Tobishima.” A030. But the Patent Office reached its conclusion without identifying any evidence that would have prompted one of ordinary skill to do so and without disagreeing with any of Celgard’s evidence that demonstrated that one of ordinary skill would not, in fact, combine the two references because the references addressed different solutions to different problems and would not have any reasonable expectation of success. *Id.* The Patent Office thus performed a hindsight analysis and focused on whether each of the references contained the individual elements of the claims, rather than considering the claimed invention as a whole. The Patent Office also improperly focused on the fact that each reference provided a means (notably, not the same means) for increasing mechanical strength—a fact not relevant to the crux of the claimed invention—the ability to block dendrite growth. The Patent Office did not consider whether the prior art combination constituted a “predictable solution” that “leads to the anticipated success.” *See KSR*, 550 U.S. at 421.

The Patent Office further failed to give due weight to the objective indicia of nonobviousness, such as industry praise, commercial success, long-felt but unresolved need, and copying which underscored the nonobviousness of the claimed invention. This un rebutted evidence was powerful evidence that the claimed invention was not

obvious. Yet, the Patent Office simply disregarded it as not overcoming what it considered incorrectly as a strong case of obviousness.

The Federal Circuit affirmed the Patent Office's decision without opinion. App. 1a-2a. The decision was labeled as a "Notice of Entry of Judgment *Without Opinion*" and stated that "[t]he judgment of the court in your case was entered today pursuant to Rule 36. This Court affirmed the judgment or decision that was appealed. None of the relief sought in the appeal was granted. *No opinion* accompanied the judgment." App. 1a (emphases added).

The Federal Circuit denied Celgard's petition for rehearing and rehearing *en banc*. App. 63a.

### **REASONS FOR GRANTING THE PETITION**

This case involves the identical issue as *Oil States*, in which this Court granted certiorari. Specifically, in *Oil States*, this Court granted certiorari to consider the issue of "[w]hether *inter partes* review, an adversarial process used by the Patent and Trademark Office (PTO) to analyze the validity of existing patents, violates the Constitution by extinguishing private property rights through a non-Article III forum without a jury." This case also is an appeal from an *inter partes* review, in which the Patent Office held Celgard's patent invalid. Accordingly, this Court should hold this petition pending resolution of the *Oil States* decision.

This case also involves the Federal Circuit's pervasive issuance of Rule 36 judgments without opinions to affirm

invalidity determinations by the Patent Office. This expansive practice of issuing Rule 36 judgments, which by definition are “without opinion,” conflicts with 35 U.S.C. § 144, which requires the Federal Circuit to issue a “mandate *and opinion*” for every appeal from the Patent Office. 35 U.S.C. § 144 (emphasis added). In addition to being statutorily prohibited, this practice has far exceeded the narrow scope contemplated by the local rule.

In 2016, the Federal Circuit relied upon Rule 36 to affirm a staggering 58% of appeals from the Patent Office. See Jason Rantanen, *Data of Federal Circuit Appeals and Decisions*, PatentlyO (June 2, 2016), <https://patentlyo.com/patent/2016/06/circuit-appeals-decisions.html>. No other circuit court renders judgments without opinions at such a rate. In fact, numerous circuit courts *prohibit* the issuance of judgments without opinions. The high rate of Rule 36 judgments in the Federal Circuit is particularly disconcerting when they are used to affirm legal issues, such as in this case, which require *de novo* review. This pervasive practice has resulted in the Federal Circuit creating unique rules and procedures for the patent system and its docket, which this Court has routinely prohibited.

This practice has also harmed litigants and troubled the patent community as the judgments provide no rationale for or explanation of an affirmance of a Patent Office decision to invalidate a patent. Thus, the Federal Circuit is failing in its responsibility to provide uniformity to the patent law. This case presents a timely opportunity for the Court to address this well-known and important issue.

This petition also raises the important question of whether the Patent Office's consistent practice of failing to consider the claimed invention "as a whole" and failing to consider whether the combination of elements would lead to "anticipated success" violates fundamental premises of obviousness and reflects a growing trend where the Federal Circuit continues to bless the Patent Office's incorrect obviousness analysis.

**I. This Case is an Appeal from an *Inter Partes* Review Proceeding and Involves the Same Issue as *Oil States*, in Which This Court Has Granted Certiorari**

In a petition to the Supreme Court, Oil States argued that an *inter partes* review proceeding, such as the one used in this case to invalidate Celgard's patent, is unconstitutional because it deprives the guarantee of a jury and an Article III court for adjudication of patent rights. On June 12, 2017, the Supreme Court granted Oil States' petition for certiorari to consider whether *inter partes* review proceedings violate the Constitution. 16-00712 QP Report; *Oil States Energy Servs., LLC v. Greene's Energy Grp., LLC*, No. 16-712, 2017 U.S. LEXIS 3727, at \*1 (June 12, 2017).

Because this case involves a patent that was invalidated through an *inter partes* review proceeding and involves the same issue as in *Oil States*, this Court's decision in *Oil States* will affect this case. Accordingly, Celgard requests that this Court hold this petition pending the outcome of *Oil States*. If the Court determines in *Oil States* that *inter partes* review proceedings are unconstitutional, it should grant this petition, vacate the decision below and remand for further consideration.

## II. This Court's Review is Necessary to Curtail the Federal Circuit's Pervasive Issuance of Rule 36 Judgments Without Opinions

### A. Fed. Cir. Rule 36 Conflicts with 35 U.S.C. § 144

The Federal Circuit offered only a single word—affirmed—in its decision to uphold the obviousness determination of the Patent Office in this case. Federal Circuit Rule 36 by its definition is a “judgment of affirmance without opinion.” FED. CIR. R. 36. Such judgments without opinions are permitted where the decision either “warrants affirmance under the standard of review” (FED. CIR. R. 36(d)) or “has been entered without an error of law” (FED. CIR. R. 36(e)). This rule is expansive in scope and effectively permits the Federal Circuit to affirm for any reason, as evidenced by the fact that the Federal Circuit relies upon Rule 36 to affirm more than 50% of its appeals from the Patent Office.

A Rule 36 “judgment of affirmance without opinion” violates 35 U.S.C. § 144, which requires the Federal Circuit to issue “opinions” for appeals from the Patent Office. The entirety of Section 144 of Title 35, the Patent Act, provides that the Federal Circuit “shall review the decision from which an appeal is taken on the record before the Patent and Trademark Office.” The statute further provides that “[u]pon its determination the court shall issue to the Director its mandate and *opinion*, which shall be entered of record in the Patent and Trademark Office and shall govern the further proceedings in the case.” *Id.* (emphasis added).



The plain and ordinary meaning of the statute requires the Federal Circuit to issue opinions for appeals from the Patent Office. Where, as here, the language of the statute is plain and unambiguous, it is applied according to its terms. *See Consumer Prod. Safety Comm'n v. GTE Sylvania, Inc.*, 447 U.S. 102, 108 (1980) (“We begin with the familiar canon of statutory construction that the starting point for interpreting a statute is the language of the statute itself. Absent a clearly expressed legislative intention to the contrary, that language must ordinarily be regarded as conclusive.”). “[I]n interpreting a statute a court should always turn first to one, cardinal canon before all others. . . . [C]ourts must presume that a legislature says in a statute what it means and means in a statute what it says there.” *Connecticut Nat’l Bank v. Germain*, 503 U.S. 249, 253-54 (1992). Indeed, “[w]hen the words of a statute are unambiguous, then, this first canon is also the last: ‘judicial inquiry is complete.’” *Id.* at 254. This Court presumes “that the plain language of the statute expresses congressional intent.” *Ardestani v. INS*, 502 U.S. 129, 135 (1991). The plain language of 35 U.S.C. § 144 could not be more clear and unambiguous in requiring the Federal Circuit to issue an opinion for appeals from the Patent Office. The statutory language is not permissive; it is compulsory.

The judgments under Rule 36 are not opinions and thus violate 35 U.S.C. § 144’s requirement that the Federal Circuit issue opinions for appeals from the Patent Office. The Federal Circuit itself acknowledges that Rule 36 judgments are not opinions in the title of such decisions: “Notice of Entry of Judgment Without Opinion.” Moreover, such a judgment states that “[n]o opinion accompanied the judgment.” The Federal Circuit has acknowledged in its

cases that Rule 36 judgments provide no opinion, stating that “[s]ince there is no opinion, a Rule 36 judgment simply confirms that a trial court entered the correct judgment.” *Rates Tech., Inc. v. Mediatrix Telecom, Inc.*, 688 F.3d 742, 750 (Fed. Cir. 2012). To be sure, Black’s Law Dictionary defines an opinion as the “court’s written statement explaining its decision in a given case.” Black’s Law Dictionary (10th ed. 2014). A Rule 36 judgment provides no explanation for its decision. Thus, an affirmance under Rule 36 clearly does not constitute an “opinion” as referred to in 35 U.S.C. § 144, and therefore Rule 36 judgments violate the plain terms of the statute.

The specific language of 35 U.S.C. § 144 trumps the general language of 28 U.S.C. § 2071(a) that permits federal courts to “prescribe rules for the conduct of their business.” *See Rodgers v. United States*, 185 U.S. 83, 88 (1902) (“The rule is *generalia specialibus non derogant*. The general principle . . . is that a general act is not to be construed to repeal a previous particular act, unless there is some express reference to the previous legislation on the subject, or unless there is a necessary inconsistency in the two acts standing together.”). In addition, although Congress granted federal courts the authority to prescribe rules, those rules must be “consistent with Acts of Congress.” 28 U.S.C. § 2071(a). In this case, Federal Circuit Rule 36, when used to affirm appeals from the Patent Office, is not consistent with the language of 35 U.S.C. § 144, which expressly requires opinions.

Academics and commentators have recently focused on the conflict between Federal Circuit Rule 36 and 35 U.S.C. § 144. Specifically, Professor Crouch has detailed the conflict in *Wrongly Affirmed Without Opinion*, WAKE

FOREST L. REV. 52 (2017), University of Missouri School of Law Legal Studies Research Paper No. 2017-02. Professor Crouch points out that the purposes of the statute support a conclusion that the statute requires a written opinion and reflects the “longstanding recognition of the public nature of patent rights.” *Id.* at 5. He notes that the “statutory requirement of issuing ‘its . . . opinion’ is not an illusory request that can be avoided by simply not writing an opinion.” *Id.* at 19. He further recognizes that the “Federal Circuit’s judicial reasoning—even when affirming a PTO determination cancelling one or more patent claims—will likely be highly relevant to later cases involving closely related inventions either in the US or abroad.” *Id.* at 23.

In sum, the Federal Circuit’s issuance of a Rule 36 judgment without opinion in this case—much less in more than 50% of appeals from the Patent Office—conflicts with the statute and thus is legally barred.

**B. In Addition to Being Statutorily Barred, the Federal Circuit’s Issuance of Rule 36 Judgments Without Opinions Has Exceeded the Bounds of Reasonableness and Should be Curtailed**

While no doubt judgments without opinions may be useful in unique cases where, for example, an issue has become moot, affirming more than 50% of appeals from the Patent Office without an opinion far exceeds the reasonable scope of 28 U.S.C. § 2071(a), which permits appellate courts to “prescribe rules for the conduct of their business.” 28 U.S.C. § 2071(a). This Court has cautioned that local rules are not without limit. *See Frazier v. Heebe*, 482 U.S. 641, 645 (1987). The application of Rule 36 has effectively become limitless.

Commentators have been following the steady rise in Rule 36 judgments. One article noted that in 2013, 96 of a total of 264 appeals were Rule 36 judgments without opinions (36%); in 2014, 111 of a total of 314 appeals were Rule 36 judgments without opinions (35%); in 2015, 155 of a total of 351 appeals were Rule 36 judgments without opinions (44%); and in 2016, 179 of a total of 416 appeals were Rule 36 judgments without opinions (43%). *See* Matthew Bultman, *Fed. Circ. Issuing More ‘Hidden Decisions’ Amid Case Influx*, Law360 (Mar. 1, 2017), <https://www.law360.com/articles/894024/fed-circ-issuing-more-hidden-decisions-amid-case-influx>. The percentage of Rule 36 judgments in appeals arising from the Patent Office is even higher: 51% in 2013, 48% in 2014, 58% in 2015, and 58% in 2016. *See* Jason Rantanen, *Data of Federal Circuit Appeals and Decisions*, PatentlyO (June 2, 2016).

With such a high percentage of cases being affirmed without opinion, the Federal Circuit’s widespread use of Rule 36 has exceeded the bounds of reasonableness. Indeed, the Federal Circuit stands alone in its high rate of Rule 36 judgments without opinions, which underscores that it has exceeded the bounds of reasonableness. The First, Fourth, Sixth, Ninth, Eleventh, and D.C. Circuits *prohibit* the issuance of judgments without opinion, and require an opinion to accompany each judgment.<sup>3</sup> *See* 1<sup>ST</sup> CIR. R. 36; 4<sup>TH</sup> CIR. R. 36.3; 6<sup>TH</sup> CIR. R. 36; 9<sup>TH</sup> CIR. R. 4.3a; 11<sup>TH</sup> CIR. R. 36-1 (rescinded Aug. 1, 2006); D.C. CIR.

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3. Until recently, the Seventh Circuit also prohibited judgments without opinions pursuant to 7<sup>TH</sup> CIR. R. 53(B). However, the Seventh Circuit Rule 53 is currently noted as rescinded. *See* <http://www.ca7.uscourts.gov/rules/rules.htm#cr53>.

R. 36(b). In particular, the Eleventh Circuit previously permitted affirmances without opinions. *See* 11<sup>TH</sup> CIR. R. 36-1 (prior to Aug. 1, 2006). However, on August 1, 2006, the rule was “rescinded, since only a minuscule portion of appeals are currently terminated in this manner.” *Table of Proposed Revisions to the Eleventh Circuit Rules* (Apr. 3, 2006) at 2. The Eleventh Circuit no longer permits summary affirmances. Interestingly, the Ninth Circuit, which had the largest number of appeals filed in 2016 at over 11,000 (compared to over 1,000 at the Federal Circuit) (*Federal Judicial Caseload Statistics*, United States Courts (2016)) prohibits judgments without opinions and requires in every case that it “provide the parties and the district court with a concise explanation of [the] court’s decision.” 9<sup>TH</sup> CIR. R. 4.3a. Thus, any argument that the Federal Circuit needs Rule 36 to efficiently dispose of the large number of appeals from the Patent Office is undermined by the Ninth Circuit’s significantly larger number of appeals to decide.

Although six circuit courts, including the Federal Circuit, have local rules permitting disposing of appeals with judgments without opinions, none have used it as frequently and as consistently as the Federal Circuit. *See Federal Court Management Statistics, December 2016*, United States Courts (Dec. 31, 2016); *Federal Judicial Caseload Statistics*, United States Courts (2016). And many of these courts still encourage explanations. The Second and Third Circuits, for example, expressly encourage explanations for their judgments. *See* 2<sup>D</sup> CIR. IOP 32.1.1(a); 3<sup>D</sup> CIR. IOP 6.3.2. In fact, in 2016, three circuits—the Second, Fifth and Tenth Circuits—did not issue *any* judgments without opinions. *See Federal Court Management Statistics, December 2016*, United

States Courts (Dec. 31, 2016); *Federal Judicial Caseload Statistics*, United States Courts (2016).

The circuit courts are thus split as to the permissibility of judgments without opinions. The Federal Circuit is in the minority. And this situation is no different from a circuit split as to substantive case holdings. The effect of both is a lack of uniformity among the circuit courts.

The staggering rate at which the Federal Circuit issues Rule 36 judgments also is inconsistent with the principles of right and justice. While a court has “discretion to adopt local rules that are necessary to carry out the conduct of its business” such discretion is “not, however, without limits.” *Frazier v. Heebe*, 482 U.S. 641, 645 (1987). Indeed, “[t]his Court may exercise its inherent supervisory power to ensure that these local rules are consistent with ‘the principles of right and justice.’” *Id.*

The frequency at which the Federal Circuit issues Rule 36 judgments is of great concern among litigants, scholars, and the patent community. Indeed, more than 20 petitioners with appeals from the Federal Circuit have raised this issue to this Court highlighting that this is not a trivial or inconsequential issue.<sup>4</sup> In addition,

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4. These include: Pet. for Writ of Cert., *Shore v. Dir.*, U.S. Patent & Trademark Office, No. 16-240 (Apr. 13, 2017); Pet. for Writ of Cert., *Oil States Energy Services, LLC v. Greene’s Energy Group, LLC*, No. 16-712 (Nov. 23, 2016); Pet. for Writ of Cert., *Cloud Satchel, LLC v. Barnes & Noble, Inc.*, No. 15-1161 (Mar. 16, 2016); Pet. for Writ of Cert., *Concaten, Inc. v. AmeriTrak Fleet Solutions, LLC*, No. 16-1109 (Mar. 10, 2016); Pet. for Writ of Cert., *Hyundai Motor America, Inc. v. Clear With Computers, LLC*, No. 13-296 (Sept 3, 2013); Pet. for Writ of Cert., *Kastner v.*

commentators in the field have written numerous articles on the impropriety of this practice. *See e.g.*, Peter Harter & Gene Quinn, *Rule 36: Unprecedented Abuse at the Federal Circuit*, IPWatchdog (Jan. 12, 2017), <http://www.ipwatchdog.com/2017/01/12/rule-36-abuse-federal-circuit/id=76971/>; *see also* Gene Quinn, *Rule 36 Judgment: The growing problem of one word affirmance by the Federal Circuit*, IPWatchdog (Aug. 22, 2016), <http://www.ipwatchdog.com/2016/08/22/rule-36-judgment/id=72108/>. Such a high rate of Rule 36 judgments without opinions, largely used to affirm Patent Office decisions that invalidate a patent, is inconsistent with the principles of right and justice—here, the guaranteed right under the Constitution for an inventor to secure for a limited time her discovery. U.S. CONST. art. I, § 8, cl. 8.

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*Chet's Shoes, Inc.*, No. 11-776 (Dec. 20, 2011); Pet. for Writ of Cert., *Romala Stone, Inc. v. Home Depot U.S.A., Inc.*, No. 10-777 (Dec. 8, 2010); *White v. Hitachi, Ltd.*, 565 U.S. 825 (2011); *Max Rack, Inc. v. Hoist Fitness Sys., Inc.*, 564 U.S. 1057 (2011); *Tehrani v. Polar Electro*, 556 U.S. 1236 (2009); Pet. for Writ of Cert., *Wayne-Dalton Corp. v. Amarr Co.*, No. 09-260 (Aug. 31, 2009); Pet. for Writ of Cert., *DePalma v. Nike, Inc.*, No. 05-1360 (Apr. 24, 2006); Pet. for Writ of Cert., *City of Gettysburg v. United States*, No. 06-235 (Aug. 14, 2006); Pet. for Writ of Cert., *Hancock v. Dep't of Interior*, No. 06-93 (July 18, 2006); *Laberge v. Dep't of Navy*, 541 U.S. 935 (2004); *Bivings v. Dep't of Army*, 541 U.S. 935 (2004); *Bowen v. Bd. of Patent Appeals & Interferences*, 530 U.S. 1263 (2000); *U.S. Surgical Corp. v. Ethicon*, 517 U.S. 1164 (1996); *Donaldson Co., Inc. v. Nelson Industries, Inc.*, 516 U.S. 1072 (1996); *Pirkle v. Ogontz Controls Co.*, 516 U.S. 863 (1995); *Schoonover v. Wild Injun Prods.*, 516 U.S. 960 (1995) *Intermedics, Inc. v. Ventritex Co.*, 513 U.S. 876 (1994); *In re Bucknam*, 502 U.S. 1060 (1992); *Astronics Corp. v. Patecell*, 506 U.S. 967 (1992).

Also, the high rate of Rule 36 affirmances fails to comport with the basic tenet of appellate jurisprudence—to provide opinions to articulate the law and provide guidance to litigants on the interpretation of the law. Indeed, numerous courts have commented on the importance of opinions with articulated reasoning. In *Ayres v. United States*, for example, the Court of Claims stated that the requirement of written opinions was a “cardinal principle of Anglo-Saxon jurisprudence.” 44 Ct. Cl. 48 (1908). Moreover, in *United States v. Forness*, 125 F.2d 928, 942 (2d Cir. 1942), the court stated that:

as every judge knows, to set down in precise words the facts as he finds them is the best way to avoid carelessness in the discharge of that duty: Often a strong impression that . . . the facts are thus-and-so gives way when it comes to expressing that impression on paper.

Justice Cardozo explained that long appellate tradition favors explanatory opinions and that the role of appellate courts is not simply “declaring justice between man and man, but of settling the law.” Benjamin N. Cardozo, *Jurisdiction of the Court of Appeals* (2d ed. 1909) § 6 (quoted in Dennis Crouch, *Wrongly Affirmed Without Opinion*, WAKE FOREST L. REV. 52 (2017), University of Missouri School of Law Legal Studies Research Paper No. 2017-02.).

In addition, Rule 36 judgments without opinions fail to advance the very purpose that Congress had for the creation of the Federal Circuit—to provide uniformity in patent law. *See* H.R. Rep. No. 97-312, at 20-23 (1981); S. Rep. No. 97-275, at 5-6 (1981). The Federal Circuit is



often the final arbiter for patent cases. With the Federal Circuit providing Rule 36 judgments in over 50% of Patent Office appeals, in over 50% of those cases, there is no advancement of the patent law.

Issuing so many Rule 36 judgments for patent cases is particularly concerning because many of these cases, including Celgard's present case, involve issues of law reviewed *de novo*, in which the Federal Circuit owes the Patent Office no deference. In this case, the issue was obviousness, a legal issue. The Federal Circuit was required to take an independent review of the obviousness determination. This is thus not a case where the Federal Circuit was simply affirming under a substantial evidence standard. Nor is it a clear case of obviousness. It is particularly inappropriate for the Federal Circuit to issue Rule 36 judgments in patent cases, such as this, involving issues of law and that would benefit from understanding the court's independent review of the legal issue.

The proliferation of Rule 36 judgments without opinions at the Federal Circuit has exceeded the bounds of reasonableness, is hindering the advancement of patent law, and offends the notions of right and justice. It is being used to invalidate important patents, such as the one in this case, and has deprived Celgard of any articulated basis for why its patent covering its revolutionary invention is invalid. This practice must be stopped or curtailed.

### **III. The Decisions Below Conflict with Precedent on the Correct Standard for Assessing Obviousness.**

The Patent Office has been consistently failing to conduct the proper obviousness analysis. The statute

requires that the claimed invention be considered “as a whole.” 35 U.S.C. § 103. This Court in *KSR* has also instructed that whether the combination of elements would lead to “anticipated success” is an important consideration in an obviousness determination to avoid hindsight. The Patent Office failed to consider these fundamental premises of obviousness, which resulted in an incorrect obviousness determination. This Court should grant certiorari to require the Patent Office and the Federal Circuit to follow the statute and this Court’s law on obviousness.

**A. The Patent Office Failed to Consider the Claimed Invention “as a Whole” and Therefore Failed to Follow 35 U.S.C. § 103**

The Patent Office has been consistently failing to conduct the proper obviousness analysis by failing to consider the claimed invention as a whole. Section 103 of Title 35 requires consideration of whether “the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious [] to a person having ordinary skill in the art . . . .” The Federal Circuit has elaborated that “[i]nventions typically are new combinations of existing principles or features. The ‘as a whole’ instruction in title 35 prevents evaluation of the invention part by part.” *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332, 1337 (Fed. Cir. 2005) (internal citation omitted).

Without consideration of the invention “as a whole,” an obviousness assessment may improperly import hindsight into the analysis “break[ing] an invention into its component parts, then find[ing] a prior art reference

corresponding to each component.” *Id.* It is thus important that an invention is “viewed not after the blueprint has been drawn by the inventor, but as it would have been perceived in the state of the art that *existed* at the time the invention was made.” *Sesonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1570 (Fed. Cir. 1996) (emphasis added). Use of the invention as a blueprint to find its components in the prior art improperly “import[s] hindsight into the obviousness determination” and “discount[s] the value of combining various existing features or principles in a new way to achieve a new result—often the essence of invention.” *Princeton*, 411 F.3d at 1337. To avoid hindsight, the ultimate inquiry thus becomes whether “a person of ordinary skill in the art would have combined elements from specific references *in the way the claimed invention does.*” *ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012) (citing *KSR*, 550 U.S. at 418) (emphasis added).

This case is an example of where the Patent Office failed to consider the claimed invention as a whole and how this yielded an incorrect obviousness determination. Celgard’s claimed invention is a battery separator with two layers, one of which is a ceramic composite layer with inorganic particles in a matrix material; this layer blocks dendrite growth. The ability to block dendrite growth is an explicit requirement of the claims and is what made Celgard’s separator safe and successful. Thus, any obviousness determination must consider this important requirement that separates it from the unsuccessful and unsafe separators before it. Rather than consider whether the differences between the prior art and the claimed invention were such that the invention “as a whole” was obvious, the Patent Office considered whether the prior art references contained the constituent elements of the claim.

It was undisputed, however, that neither prior art reference, Tobishima or Tojo, discloses a separator with a ceramic composite layer adapted to block dendrite growth. Tobishima describes a nonporous gel-like electrolyte impregnated polymer film. A205 [0006]; A165, ¶87. Tobishima relies upon the overall thickness of the gelatinous polymer film—without any inorganic particles—to purportedly prevent dendrite growth. A205, [0006], A206, [0009]-[0010]; A165, ¶87. Tobishima's patent application was never examined and there is no evidence that its described separator was ever produced or that it was functional. Tojo also does not describe a ceramic composite layer to block dendrite growth. Tojo is not concerned about dendrites or problems that take place during use of the battery; instead, Tojo addresses the manufacturing problem of large electroconductive particles that flake off an electrode during battery manufacture and cut through the separator. To address this problem, Tojo teaches a coated separator layer—called a surface protection layer—with large open holes and inorganic particles. A191 [0005]; A337; A373. The open holes are critical to the operation of Tojo's separator. Yet because Tojo's separator includes large open holes, it cannot block dendrite growth. A018. The Patent Office agreed, which is why it correctly decided that Tojo alone could not anticipate or render obvious the claimed invention.

Given the different problems addressed by Tobishima and Tojo (and their respective, different solutions), a threshold question for obviousness should have been whether it would have been obvious to combine the references to achieve a two-layer separator that blocks dendrite growth. Had this question been considered, which

would have considered the claimed invention as a whole, the Patent Office would have found that the combination would destroy the very purpose of the references and would result in a separator with “open holes” that cannot block dendrite growth.

Instead of considering the claimed invention “as a whole” and its unique ability to block dendrite growth through a ceramic composite layer, the Patent Office instead looked to whether the references contained all the elements of the claims. This analysis is not proper. The statute requires, after all, not just consideration of the claim language but the claimed invention “as a whole.” However, here the Patent Office’s approach to obviousness, which was adopted by the Federal Circuit, represented an improper analysis fraught with hindsight and thus violated Section 103. This is especially true where, as here, ample evidence of objective indicia of nonobviousness exists.

The Patent Office’s failure to consider the claimed invention “as a whole” in its obviousness analysis in violation of Section 103 has become a widespread problem. In *inter partes* review challenges based on obviousness, the Patent Office has been invalidating claims at a rate of 50%. See *Most Comprehensive Study of Patent Trial and Appeal Board Decisions Shows Rate of Unpatentability Findings Overstated*, Business Wire (Apr. 11, 2016) <http://www.businesswire.com/news/home/20160411006275/en/Comprehensive-Study-Patent-Trial-Appeal-Board-Decisions>. And the Federal Circuit has been affirming the Patent Office’s decisions at a rate of 70%, many of them Rule 36 judgments. Christina Violante, *Law360’s Federal Circuit Snapshot: By the Numbers*, Law360 (Mar. 1, 2017), <https://www.law360.com/>

articles/894751/law360-s-federal-circuit-snapshot-by-the-numbers. Thus, the Federal Circuit has failed to correct the Patent Office's frequent violation of Section 103. This Court must step in to correct the Patent Office and the Federal Circuit from failing to follow Section 103 and this Court's precedent on obviousness, which has resulted in Celgard's patent covering its revolutionary separator being invalidated.

**B. The Patent Office Failed to Consider Whether the Combination of References Would Yield “Anticipated Success” and Therefore Failed to Follow This Court’s Precedent**

The Patent Office also has been consistently failing to conduct the proper obviousness analysis by failing to consider whether the combination of elements would lead to anticipated success. In *KSR*, this Court held that for a claimed combination of elements to have been obvious, the combination must constitute a “predictable solution[]” that “leads to the anticipated success.” *KSR*, 550 U.S. at 421. The Court considered *United States v. Adams*, in which the question before the Court was whether the combination of elements that resulted in the claimed “wet battery” “yielded a predictable result.” 383 U.S. 39, 42-43 (1966). It found that it did not, and the Court in *KSR* explained that in *Adams* the “elements worked together in an unexpected and fruitful manner.” *KSR*, 550 U.S. at 416. This Court also noted that the “combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, 550 U.S. at 416. As *KSR* makes clear, predictability and anticipated success are vital considerations in the obviousness analysis. See *Eurand, Inc. v. Mylan Pharms.*,

*Inc. (In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.)*, 676 F.3d 1063, 1069, 1073 (Fed. Cir. 2012) (finding no “reasonable expectation” of success and holding that co-inventors did more than make “predictable use of known prior art elements.”).

The Federal Circuit has articulated that an obviousness analysis considers whether a skilled artisan “would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” *InTouch Techs., Inc. v. VGo Commc’ns, Inc.*, 751 F.3d 1327, 1347 (Fed. Cir. 2014) (internal citations omitted).

This case is an example of where the Patent Office failed to consider whether the combination of elements is a predictable solution that leads to anticipated success, which resulted in an incorrect obviousness determination. The Patent Office relied on the references’ disclosures of different methods of increasing “mechanical strength” as a reason to combine the references despite no evidence that the references would (or even could) be combined to achieve the claimed invention. Had the Patent Office considered whether the combination of elements is a predictable solution that leads to anticipated success, it would have found that combining the references would result in an inoperable battery. A287-289; A371-373; A419. Celgard’s expert testified that one would not be motivated to combine the references, as such a combination “would result in a battery that simply did not work because the separator was not sufficiently conductive.” A419. Celgard provided un rebutted evidence that the addition of Tojo’s inorganic particles to Tobishima’s soft film would decrease

the conductivity of any resulting separator and would render the separator inoperable. A419. Celgard's expert stated that adding Tojo's inorganic particles to Tobishima's polymer film "would result in a battery that simply did not work" because the separator would not be sufficiently conductive. A419, ¶ 36. The Patent Office thus failed to consider the technical consequence of adding Tojo's inorganic particles (and its "open holes") to Tobishima's polymer film and that such a combination would not lead to "anticipated success" of blocking dendrite growth, which is important to the claimed invention.

By failing to consider whether the elements would have led to a "predictable solution" and "anticipated success," the Patent Office's decision is fraught with hindsight. *KSR*, 550 U.S. at 421. This is reflected in its focus on isolated statements in each of the references regarding very different ways to increase mechanical strength. While a motivation to combine elements is important to an obviousness determination to avoid hindsight, equally important is consideration of whether the combined elements lead to anticipated success. A finding of one does not presume the other. Here, the Patent Office should have considered both inquiries but fell short.

The failure to follow proper precedent in this case deprived Celgard of patent protection for its revolutionary and important battery separator technology. This Court's review is necessary to protect the investment in and the innovation of patents, such as Celgard's patent, and to ensure that the proper standard for assessing obviousness is applied by the Patent Office and the Federal Circuit.



**CONCLUSION**

For all the above reasons, Celgard respectfully requests that the Court grant its petition for writ of certiorari.

Respectfully submitted,

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## **APPENDIX**

**APPENDIX A — JUDGMENT OF THE UNITED  
STATES COURT OF APPEALS FOR THE  
FEDERAL CIRCUIT, FILED DECEMBER 13, 2016**

UNITED STATES COURT OF APPEALS  
FOR THE FEDERAL CIRCUIT

***(CORRECTED)* NOTICE OF ENTRY OF  
JUDGMENT WITHOUT OPINION**

JUDGMENT ENTERED: 12/13/2016

The judgment of the court in your case was entered today pursuant to Rule 36. This Court affirmed the judgment or decision that was appealed. None of the relief sought in the appeal was granted. No opinion accompanied the judgment. The mandate will be issued in due course.

Information is also provided about petitions for rehearing and suggestions for rehearing en banc. The questions and answers are those frequently asked and answered by the Clerk's Office.

No costs were taxed in this appeal.

Regarding exhibits and visual aids: Your attention is directed to FRAP 34(g) which states that the clerk may destroy or dispose of the exhibits if counsel does not reclaim them within a reasonable time after the clerk gives notice to remove them. (The clerk deems a reasonable time to be 15 days from the date the final mandate is issued.)

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*Appendix A*

FOR THE COURT

/s/ Peter R. Marksteiner

Peter R. Marksteiner

Clerk of Court

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*Appendix A*

UNITED STATES COURT OF APPEALS  
FOR THE FEDERAL CIRCUIT

2016-1218

IN RE: CELGARD, LLC,

*Appellant*

Appeal from the United States Patent and Trademark  
Office, Patent Trial and Appeal Board in No. IPR2014-  
00692.

**JUDGMENT**

THIS CAUSE having been heard and considered, it is

ORDERED and ADJUDGED:

PER CURIAM (PROST, *Chief Judge*, LOURIE and MOORE,  
*Circuit Judges*).

**AFFIRMED. *SEE* FED. CIR. R. 36.**

ENTERED BY ORDER OF THE COURT

December 13, 2016  
Date

/s/ Peter R. Marksteiner  
Peter R. Marksteiner  
Clerk of Court

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**APPENDIX B — FINAL WRITTEN DECISION  
OF THE UNITED STATES PATENT AND  
TRADEMARK OFFICE, DATED OCTOBER 5, 2015**

UNITED STATES PATENT  
AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL  
AND APPEAL BOARD

Case IPR2014-00692  
Patent 6,432,586 B1

LG CHEM, LTD.,

*Petitioner,*

v.

CELGARD, LLC,

*Patent Owner.*

Before FRANCISCO C. PRATS, DONNA M. PRAISS,  
and CHRISTOPHER L. CRUMBLEY, *Administrative  
Patent Judges.*

PRAISS, *Administrative Patent Judge.*

**FINAL WRITTEN DECISION**  
*35 U.S.C. § 318(a) and 37 C.F.R. § 42.73*

*Appendix B***I. INTRODUCTION****A. Statement of the Case**

LG Chem, Ltd. (“Petitioner” or “LG Chem”) filed a Petition (Paper 4, “Pet.”) to institute an *inter partes* review of claims 1–12 of U.S. Patent No. 6,432,586 B1 (Ex. 1001, “the ’586 patent”) pursuant to 35 U.S.C. §§ 311–319. A Preliminary Response was filed by Celgard, LLC (“Patent Owner” or “Celgard”) on August 1, 2014. Paper 8. On October 8, 2014, we instituted an *inter partes* review of claims 1–12 on the following grounds:

<b>Claims Challenged</b>	<b>Basis<sup>1</sup></b>	<b>Reference(s)</b>
1–3, 5, 6, and 11	§ 102(b)	Tojo <sup>2</sup>
4, 7–10, and 12	§ 103(a)	Tojo
1–6 and 11	§ 103(a)	Tobishima <sup>3</sup> and Tojo

Paper 13 (“Dec. to Inst.”).

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1. The application which issued as the ’586 patent was filed on April 10, 2000. Ex. 1001, cover page. Accordingly, the versions of §§ 102 and 103 in effect before the Leahy-Smith America Invents Act (AIA) apply to the claims of the ’586 patent. *See* AIA, Pub. L. No. 112-29, § 3, 125 Stat. 284, 288 (2011).

2. JP 11-80395 (pub. Mar. 26, 1999) (Ex. 1010) (as translated, Ex. 1004).

3. JP 5-190208 (pub. July 30, 1993) (Ex. 1013) (as translated, Ex. 1005).

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After trial was instituted, Patent Owner filed a Response on February 6, 2015. Paper 32 (“PO Resp.”). On May 4, 2015, Petitioner filed a Reply. Paper 52 (“Reply”).

Petitioner supports its challenges with a Declaration, executed April 25, 2014, by Kuzhikalail M. Abraham, Ph.D. (“Abraham Decl.”) (Ex. 1003). Patent Owner relies on a Declaration executed by Ralph E. White, Ph.D., P.E., on February 6, 2015 (“White Decl.”) (Ex. 2002), a Declaration executed by C. Glen Wensley, Ph.D., on February 6, 2015 (“Wensley Decl.”) (Ex. 2015), and a Declaration executed by William J. Paulus on February 6, 2015 (“Paulus Decl.”) (Ex. 2915).

Both parties filed Motions to Exclude Evidence. Paper 58; Paper 64.

Both parties filed Oppositions to the Motions to Exclude Evidence. Paper 69; Paper 70. Both parties filed Replies to the Oppositions to the Motions to Exclude Evidence. Paper 72; Paper 73.

An oral hearing was held on June 29, 2015. A transcript of the oral hearing is included in the record. Paper 75 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(b). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 1–11 of the ’586 patent are unpatentable.



*Appendix B**B. Related Proceedings*

The '586 patent has been asserted in the U.S. District Court for the Western District of North Carolina in *Celgard, LLC v. SK Innovation Co., Ltd.*, No. 3:13-cv-00254 and *Celgard, LLC v. LG Chem, Ltd.*, No. 3:13-cv-00043. Pet. 1.

Concurrent with this proceeding, the '586 patent claims were subject to *inter partes* review in IPR2014-00679 and IPR2014-00680 (Paper 7). Final decisions in both of those proceedings recently issued, on September 25, 2015. The '586 patent claims were also challenged in IPR2014-00524 (Pet. 1), which was recently terminated after settlement between the parties. Previously, the '586 patent was subject to an *inter partes* review, IPR2013-00637, which was terminated by agreement of the parties before any decision on whether to institute proceedings issued. *Id.* at 1–2.

*C. The '586 Patent (Ex. 1001)*

The '586 patent discloses that commercializing lithium containing high-energy rechargeable batteries has been difficult, mainly because of “dendrite growth that occurs after repetitive charge-discharge cycling.” Ex. 1001, 1:21–22. Specifically, “[w]hen lithium dendrites grow [from the lithium-containing anode] and penetrate the separator [between the electrodes], an internal short circuit of the battery occurs (any direct contact between anode and cathode is referred to as ‘electronic’ shorting, and contact made by dendrites is a type of electronic shorting).” *Id.*

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at 1:27–31. “Some shorting . . . may result in thermal runaway of the lithium battery, a serious safety problem for [a] lithium rechargeable battery.” *Id.* at 1:31–35.

To address those issues, the ’586 patent describes an improved electrode separator for a high-energy rechargeable lithium battery. *Id.* at 1:40–53. The separator includes two specific layers: “[1] at least one ceramic composite layer and [2] at least one polymeric microporous layer.” *Id.* at 1:46–47.

The ’586 patent explains that the ceramic composite layer “is, at least, adapted for preventing electronic shorting (e.g. direct or physical contact of the anode and the cathode) and blocking dendrite growth.” *Id.* at 2:54–57.

The ’586 patent explains that the ceramic composite layer is composed of a mixture of two types of components: “[1] a matrix material having [2] inorganic particles dispersed therethrough.” *Id.* at 3:9–10 (drawing reference numerals removed). The ’586 patent explains that the “[c]eramic composite layer is nonporous (it being understood that some pores are likely to be formed once in contact with an electrolyte, but ion conductivity of [that] layer is primarily dependent upon choice of the matrix material and particles).” *Id.* at 3:10–14 (drawing reference numerals removed).

The ’586 patent explains that, although the matrix material may also perform the function of carrying the battery electrolyte, the matrix material is “that component of a separator which, in part, prevents electronic shorting by preventing dendrite growth.” *Id.* at 3:18–20.

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The '586 patent explains that the matrix component of the ceramic composite layer can be “any gel forming polymer suggested for use in lithium polymer batteries or in solid electrolyte batteries.” *Id.* at 3:32–34. The '586 patent discloses that a variety of inorganic particles may be used in the ceramic composite layer, including, “for example, silicon dioxide (SiO<sub>2</sub>), aluminum oxide (Al<sub>2</sub>O<sub>3</sub>), calcium carbonate (CaCO<sub>3</sub>), titanium dioxide (TiO<sub>2</sub>), SiS<sub>2</sub>, SiPO<sub>4</sub>, and the like, or mixtures thereof. The preferred inorganic particle is SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, and CaCO<sub>3</sub>.” *Id.* at 3:53–57.

Turning to the polymeric microporous layer of the '586 patent's separator, the patent explains that that layer “is, at least, adapted for blocking (or shutting down) ionic conductivity (or flow) between the anode and the cathode during the event of thermal runaway.” *Id.* at 2:58–60.

In contrast to the substantially non-porous ceramic composite layer discussed above, the '586 patent explains that the polymeric microporous layer “consists of any commercially available microporous membranes (e.g. single ply or multi-ply), for example, those products produced by Celgard Inc. of Charlotte, North Carolina, Asahi Chemical of Tokyo, Japan, and Tonen of Tokyo, Japan.” *Id.* at 3:60–64.

*D. Illustrative Claims*

Claims 1, 7, and 12, which are the only independent claims of the '586 patent, and which are reproduced below, are illustrative of the claims at issue:

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1. A separator for a high energy rechargeable lithium battery comprises:

at least one ceramic composite layer, said layer including a mixture of inorganic particles in a matrix material; said layer being adapted to at least block dendrite growth and to prevent electronic shorting; and

at least one polyolefinic microporous layer, said layer being adapted to block ionic flow between an anode and a cathode.

7. A separator for a high energy rechargeable lithium battery comprises:

at least one ceramic composite layer or coating,

said layer including a mixture of 20–95% by weight of inorganic particles selected from the group consisting of SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, CaCO<sub>3</sub>, TiO<sub>2</sub>, SiS<sub>2</sub>, SiPO<sub>4</sub>, and mixtures thereof, and 5–80% by weight of a matrix material selected from the group consisting of polyethylene oxide, polyvinylidene fluoride, polytetrafluoroethylene, copolymers of the foregoing, and mixtures thereof; and

at least one polyolefinic microporous layer having a porosity in the range of 20–80%, an average pore size in the range of 0.02 to 2

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microns, and a Gurley Number in the range of 15 to 150 sec.

12. A separator for an energy storage system comprises:

at least one ceramic composite layer or coating, said

layer including a mixture of 20–95% by weight of inorganic particles selected from the group consisting of SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, CaCO<sub>3</sub>, TiO<sub>2</sub>, SiS<sub>2</sub>, SiPO<sub>4</sub>, and mixtures thereof, and 5–80% by weight of a matrix material selected from the group consisting of polyethylene oxide, polyvinylidene fluoride, polytetrafluoroethylene, copolymers of the foregoing, and mixtures thereof, said layer being adapted to at least block dendrite growth and to prevent electronic shorting; and at least one polyolefinic microporous layer having a porosity in the range of 20–80%, an average pore size in the range of 0.02 to 2 microns, and a Gurley Number in the range of 15 to 150 sec, said layer being adapted to block ionic flow between an anode and a cathode.

## II. ANALYSIS

### *A. Claim Interpretation*

As a first step in our analysis, we determine the meaning of the claims, for purposes of this decision, using the “broadest reasonable construction in light of

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the specification of the patent in which [they] appear[.]” 37 C.F.R. § 42.100(b). Under that standard, claim terms “are . . . given their ordinary and customary meaning,” as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech. Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) (quoting *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc)).

In the Decision to Institute, we concluded that the broadest reasonable construction of the claim recitation, “ceramic composite layer . . . adapted to at least block dendrite growth” (Ex. 1001, 4:41–44 (claim 1), 6:9–19 (claim 12)), encompasses any such layer capable of blocking dendrite growth with any degree of effectiveness. Dec. 6–7.

Patent Owner contends that our construction is unreasonably broad, and proposes instead that we construe the claim term to mean “ceramic composite layer . . . capable of preventing dendrites from growing all the way through the ceramic composite layer during the specified, stated, or intended number of repetitive charge-discharge cycles of a rechargeable battery.” PO Resp. 15.

Patent Owner contends that its construction is consistent with the language in the claims, as well as an ordinary artisan’s understanding of the claimed invention. *Id.* Specifically, Patent Owner contends that the separator, as claimed, must be suitable for use in a high energy rechargeable lithium battery, and such a battery, by definition, must be capable of undergoing a certain number of charge-discharge cycles without experiencing an electrical short, as shown by extrinsic evidence of

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industry standards. *Id.* at 18–19 (citing Ex. 1005 ¶¶ 16–18, Fig. 2; Ex. 2002 ¶ 55 (White Decl.), Ex. 2009, 21:12–22:13 (Deposition of Kuzhikalail M. Abraham, Ph.D. (“Abraham Depo.”)); Ex. 2500, 3; Ex. 2501).

Patent Owner contends that its proposed construction is consistent also with the Specification of the ’586 patent, because the primary goal of the ’586 patent is to improve prior art separators by manufacturing them such that they block dendrite formation and prevent electronic shorting. *Id.* at 15–16. Patent Owner contends that, given the ’586 patent’s focus on solving the dendrite problem in rechargeable lithium batteries, “it is reasonable to consider blocking dendrites in the context of what would result in a useful rechargeable battery that could remain effective throughout the type of repetitive charge-discharge cycling that can cause dendrites.” *Id.* at 17–18.

Petitioner, on the other hand, contends that Patent Owner’s proposed construction is not supported by either the Specification or extrinsic evidence of what a person of ordinary skill in the art would understand the claim term to mean. Reply 2–3 (citing Ex. 2002 ¶ 77; Ex. 1030, 82:15–16; Ex. 1031 ¶ 7).

We agree with Petitioner that Patent Owner’s proposed construction is not supported by the trial record.

We acknowledge, as noted above in our discussion regarding the ’586 patent disclosure, that the objective of the ’586 patent is to eliminate electronic shorts caused by lithium dendrite formation. We acknowledge also Patent

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Owner's evidence that an ordinary artisan would have understood that a primary goal of the '586 patent would have been to ensure that no dendrite-caused electronic shorting occurs during the specified, stated, or intended number of charge-discharge cycles of a rechargeable battery.

Our reviewing court, however, has "cautioned against reading limitations into a claim from the preferred embodiment described in the specification, even if it is the only embodiment described, absent clear disclaimer in the specification." *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1369 (Fed. Cir. 2004).

Patent Owner does not direct us to any specific disclosure in the Specification of the '586 patent clearly limiting or defining dendrite blocking as impeding dendrite growth for the entire intended life of a rechargeable battery. Accordingly, because the '586 patent does not clearly disclaim the scope of dendrite blocking in the manner Patent Owner advances, we are not persuaded that we should limit the claims to the asserted primary goal, or preferred result, of the '586 patent. We, therefore, decline to adopt Patent Owner's proffered claim construction.

Although we decline to read limitations from the Specification into the claims, we must, nonetheless, take into account the relevant disclosures in the Specification in determining the reasonable scope of the claims.



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The claim language at issue appears in independent claims 1 and 12, and recites, in full, that the ceramic composite layer must be “adapted to at least block dendrite growth and to prevent electronic shorting.” Ex. 1001, 4:43–44 (claim 1), 6:18–19 (claim 12).

As noted above, the Specification of the ’586 patent discloses that dendrite growth, which results in electronic shorting, occurs after repetitive charge-discharge cycling of the battery. *Id.* at 1:20–31.

The ’586 patent does not explain with any specificity, however, what structural or functional properties, for example hardness, must be possessed by a ceramic composite layer that is “adapted to” block dendrite growth. Nor does the Specification of the ’586 patent require any particular degree of effectiveness in that respect. Nonetheless, as noted above, the ’586 patent does disclose that a ceramic composite layer which is nonporous except for pores resulting from electrolyte contact, and which is composed of inorganic particles dispersed in a polymeric matrix, is adapted to block dendrite growth and prevent electronic shorting. *See id.* at 3:9–59.

In addition to the Specification, “dictionary definitions are also pertinent” in determining the broadest reasonable meaning of claim terms. *In re Trans Texas Holdings Corp.*, 498 F.3d 1290, 1299 (Fed. Cir. 2007). The ordinary meaning of “to block,” is “to obstruct by placing obstacles in the way,” and the ordinary meaning of “to obstruct,” in turn, is “to hinder, interrupt, or delay the passage, progress, course, etc. of.” Random House Webster’s College Dictionary 144, 916 (2d ed. 2000).

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Accordingly, based on the evidence before us, we conclude that the broadest reasonable construction of a ceramic composite layer, adapted to at least block dendrite growth and prevent electronic shorting, encompasses any such layer capable of hindering, interrupting, or delaying the passage, progress, or course of dendrite growth, with any degree of effectiveness sufficient to prevent electronic shorting.

Patent Owner contends that, by construing the language at issue to encompass dendrite blocking to any degree of effectiveness, we effectively rewrite the claim. PO Resp. 16. We are not persuaded. As noted above, we apply to the claims before us the broadest reasonable construction an ordinary artisan would give, in light of the Specification. In the instant case, as discussed above, Patent Owner does not direct us to any clear or specific disclosure in the Specification describing a minimum degree of dendrite growth blocking, other than electronic short prevention, to which an ordinary artisan would understand the claim to be limited.

Patent Owner contends that it is “unreasonable to have a construction that could be met by some slowing of dendrites, but would allow others to grow through and short out the battery potentially causing a fire or explosion.” *Id.* at 17. As is evident, however, claims 1 and 12 expressly require the ceramic composite layer to prevent electronic shorting. The claims, therefore, do not encompass a ceramic composite layer that allows a dendrite to grow through the separator unhindered and cause a short.

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In sum, for the reasons discussed, based on the evidence before us, we conclude that the broadest reasonable construction of a ceramic composite layer, adapted to at least block dendrite growth encompasses any such layer capable of hindering, interrupting, or delaying the passage, progress, or course of dendrite growth, with any degree of effectiveness sufficient to prevent electronic shorting.

*B. Claims 1–3, 5, 6, and 11: Anticipation by Tojo*

Petitioner contends that claims 1–3, 5, 6, and 11 of the '586 patent are unpatentable under 35 U.S.C. § 102(b) as anticipated by Tojo. Pet. 14–26.

Patent Owner contends that Tojo does not anticipate those claims because Tojo does not describe a separator with a ceramic composite layer “adapted to at least block dendrite growth and to prevent electronic shorting” as recited in claim 1, and required by its dependent claims 2, 3, 5, 6, and 11. PO Resp. 1, 21; *see also id.* at 27 (“The only issue presented in Ground 1 on claims 1–3, 5–6 and 11 is whether the teaching of Tojo discloses a ceramic composite separator layer that is inherently adapted to block dendrite growth.”).

For the reasons below, we agree with Patent Owner that Petitioner has not shown by a preponderance of the evidence that Tojo describes a separator including that feature.

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Tojo addresses issues facing separators used in high energy density lithium batteries, the type of battery recited in claims 1 and 11 of the '586 patent. Ex. 1004 ¶ 3. As required by claim 1, Tojo discloses that its separator includes two layers, a “surface protection layer” composed of a polyolefin, such as polypropylene or polyethylene, and a composite coating layer which includes “inorganic microparticles of aluminum oxide, silicon dioxide, or the like and a resin that acts as a binder.” *Id.* at 1.

As required by claim 1, the composite layer of Tojo’s separator includes inorganic particles, which may be aluminum oxide or silicon dioxide. *Id.* ¶ 18. As claim 1 also requires of its ceramic composite layer, the composite layer of Tojo’s separator includes a matrix material, termed a “binder,” which is “not particularly limited if it is one that has been used conventionally, and, for example, various polyesters, various polyolefins, various rubbers, various acrylic resins, and the like can be used alone or as mixtures.” *Id.* ¶ 22.

To show that Tojo meets claim 1’s dendrite-blocking requirement, Petitioner directs us to Tojo’s disclosure that its separators have high surface hardness and mechanical strength, which inhibit tearing and penetration by microparticles of electrode material produced during manufacture or storage, ultimately resulting in a reduced internal short circuit rate. Pet. 16 (citing Ex. 1004 ¶ 8). Petitioner relies on paragraph 43 of the Abraham Declaration to support its position that the high mechanical strength of Tojo’s composite layer, which is not prone to being penetrated by microparticles, means that

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it is capable of blocking dendrite growth and preventing electronic shorting. *Id.* at 15 (citing Ex. 1003 ¶ 43). The Abraham Declaration states:

By including a layer with inorganic materials that is not prone to being penetrated by microparticles, Tojo provides a layer that is not prone to being penetrated by dendrite growth. That is, the microparticles that are blocked by Tojo's separator layer include[] dendrites.

Ex. 1003 ¶ 43 (citation omitted).

As Patent Owner contends, however (PO Resp. 21, 25–27), Tojo describes its ceramic composite layer as “porous” and having “open holes.” Ex. 1004 ¶¶ 8, 25.

Tojo discloses that the surface protection layer can be formed “by screen printing so that it has open holes in the manner of a mesh or the like.” *Id.* ¶ 25. Alternatively, Tojo discloses:

[P]ores matching the porous structure of the substrate can be formed in the surface protection layer by performing an ultrasonic treatment on the resin constituting the surface protection layer in the presence of a poor solvent  
.....

*Id.* ¶ 26. Tojo discloses further that pores may be produced by “extracting, stretching, adding a foaming agent.” *Id.* ¶ 27. Tojo exemplifies using ultrasonication to produce pores in its ceramic composite layer. *Id.* ¶¶ 43, 46.

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Regarding the size of the open holes, Tojo discloses:

The size of the open holes is not particularly limited, but taking into account the electroconductive particle size that causes internal short-circuiting when the surface protection layer is used as a separator for a cell, 0.1  $\mu\text{m}$  to 1 mm is adequate, and 5  $\mu\text{m}$  to 20  $\mu\text{m}$  is preferred. The open holes preferably take up about 40 to 80% of the entire surface area in the surface of the surface protection layer.

*Id.* at ¶ 25.

Patent Owner argues that the ability of Toro's separator to stop hard particles is not sufficient to establish that Tojo inherently discloses the ability to block dendrites. PO Resp. 32. Patent Owner contends that dendrites do not have common characteristics with the microparticles Tojo sought to block. *Id.* at 25. According to Patent Owner, dendrites are smaller, softer, and "can adapt in size and shape over multiple cycles, whereas foreign object debris, such as electrode microparticles or burrs, introduced during cell manufacture have a fixed size and shape." *Id.* at 24 (citing Ex. 2002 ¶¶ 47, 48, 102); *see id.* at 22–23.

Moreover, Patent Owner contends, "there is greater current density where ionic flow occurs through pores, and dendrite growth will be created by and likely follow that current." *Id.* at 28–29 (citing Ex. 2002 ¶¶ 44–47, 104, 107, Ex. 2009 at 41:13–42:2). While dendrite growth through

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a separator is less likely to occur through highly tortuous pores, Patent Owner asserts that the embodiment in Tojo that provides detail about the holes in its surface hardness layer “is likely to result in holes straight through the layer with little or no tortuosity.” *Id.* at 29 (citing Ex. 1004 ¶ 25, Ex. 2002 ¶ 106). Patent Owner contends that a hole straight through the separator will not necessarily block dendrite growth. *Id.* (citing Ex. 2002 ¶ 106).

Given Dr. White’s experience in the field of battery technology, we credit his testimony on this issue. Ex. 2002 ¶¶ 3–16 (White Decl.); Ex. 2003 (Curriculum Vitae of Dr. White). Moreover, to support his opinion, Dr. White cites (Ex. 2002 ¶ 47) to the Handbook of Battery Materials (Ex. 2007, “the Handbook”), a reference to which Petitioner’s expert, Dr. Abraham, also cites (Ex. 1003 ¶ 43 (citing Ex. 1026)).

The Handbook discloses:

Even these small pores [in microporous separators] cannot prevent the formation of so-called “microshorts”, arising by metal deposition (e.g., dendrites) from the solution phase. The pores of modern separators have a diameter of about 0.1  $\mu\text{m}$ , equal to 100 nm, while metal ions have a diameter of few angstroms, equal to 0.5–1 nm. On an atomic scale even micropores are barn doors!

Ex. 2007, 247.

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As Patent Owner contends (PO Resp. 32), the opinion of Petitioner's expert, Dr. Abraham, regarding whether dendrites could grow through Tojo's porous ceramic composite layer, is based on equating the ability of a separator to block hard microparticles with the ability to block soft dendrites:

Q. So if I understand the opinion that you just gave about Tojo and microparticles and dendrites, you're saying the surface hardness of a separator would have to be harder to block or prevent tearing from microparticles than it would be to block a dendrite?

...

A. No, that's not what I said. What I said was that the surface hardness of the Tojo separator was able to stop penetration of microparticles of hard metals, so if they are able to stop penetration of microparticles of hard metals then they should definitely be able to stop microparticles of soft metals which are also metallic particles. So if something can stop a hard particle, then I would think it is easier to stop soft particles, softer metal particles.

Ex. 2009, 141:1-20.

As discussed above, the broadest reasonable construction of a ceramic composite layer, adapted to at least block dendrite growth and prevent electronic



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shorting, encompasses any such layer capable of hindering, interrupting, or delaying the passage, progress, or course of dendrite growth, with any degree of effectiveness sufficient to prevent electronic shorting. As also discussed above, Tojo discloses that the pores in its ceramic composite layer can range from 0.1  $\mu\text{m}$  to 1 mm in size. Ex. 1004 ¶ 25.

Viewing the record as a whole, including the testimony of Dr. White and Dr. Abraham, as well as the Handbook's disclosure that separator pores as small as 0.1  $\mu\text{m}$  are effectively barn doors, which cannot prevent electronic shorts caused by dendrite growth, Patent Owner persuades us that Tojo's porous ceramic composite layer is not capable of hindering, interrupting, or delaying the passage, progress, or course of dendrite growth, with any degree of effectiveness that prevents electronic shorting. That is, Patent Owner persuades us that Tojo's separators do not include a ceramic composite layer that is adapted to at least block dendrite growth and to prevent electronic shorting, as recited in claim 1 of the '586 patent.

Petitioner does not persuade us that the preponderance of the evidence supports a contrary finding.

As noted above, Petitioner bears the burden of proving unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). In the instant case, Petitioner contends that Tojo necessarily describes a ceramic composite layer adapted to at least block dendrite growth, and that Tojo's ceramic composite layer inherently blocks dendrite growth, despite the pores discussed above. Reply

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6–10. Petitioner asserts that the prevention of dendrite growth “is a distinct possibility” from Tojo’s teaching of preventing “adverse events.” *Id.* at 6. Petitioner further asserts that Tojo is not limited to straight-through pores because Tojo teaches methods of making the porous surface protection layer that “are widely used in industry to create pore structures that are highly tortuous.” *Id.* at 7. Petitioner further asserts that blocking dendrite growth is the natural result of combining polymeric matrix materials with inorganic particles of the type and proportion described in the ’586 patent because “the ’586 patent requires no other feature for achieving this property.” *Id.* at 9.

“It is well settled that a prior art reference may anticipate when the claim limitations not expressly found in that reference are nonetheless inherent in it. ‘Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates.’” *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349 (Fed. Cir. 2002). Given the evidence discussed above that the pores in Tojo’s ceramic composite layer would allow dendrite growth, Petitioner does not persuade us that, because Tojo’s ceramic composite layer contains the inorganic particles and matrix material required by claim 1, Tojo necessarily teaches that its ceramic composite layer is adapted to block dendrite growth. *See* Pet. Reply 8–10. Moreover, even assuming for argument’s sake that larger dendrites would be blocked by Tojo’s pores (*see id.* at 5), Petitioner does not dispute that dendrites may grow at an atomic scale (*id.*; Ex. 1031 ¶ 10), and the evidence discussed

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above supports a finding that Tojo's pores would not block dendrites of that size from producing an electronic short.

As Petitioner argues (Reply 7), and as noted above, Tojo discloses that the ceramic composite layer may be made "by extracting, stretching, adding a foaming agent" in addition to a screen printing process. Petitioner asserts that this means that "Tojo describes tortuous pores" (*id.* at 8) because "[s]uch methods are widely used in industry to create pore structures that are highly tortuous." *Id.* at 7 (citing Ex. 1004 ¶ 27, Ex. 1031 ¶¶ 17–20). Petitioner reasons that "[b]ecause Tojo describes tortuous pores, it would block dendrite growth by PO's own admission." *Id.* at 8 (citing Ex. 1033, 40:2–14, Ex. 2002 ¶ 221).

Petitioner does not direct us, however, to any clear or specific evidence suggesting that the "highly tortuous" pore structures allegedly produced by known methods would be in any way comparable to, or predictive of, highly tortuous pores in Tojo's porous ceramic composite layer made by extracting, stretching, or adding a foaming agent.

We acknowledge Petitioner's argument that Dr. White's testimony in one of the related district court proceedings is inconsistent with his testimony in the instant proceeding. Reply 8 n.1 (citing Ex. 1040). As noted above, however, his testimony here, that dendrites can grow through Tojo's porous ceramic composite layer (*see, e.g.* Ex. 2002 ¶ 106), is supported by the Handbook, a reference upon which Petitioner's expert also relies. Ex. 1003 ¶ 43 (citing Ex. 1026).

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Petitioner also does not persuade us (Reply 7–8) that Dr. White’s deposition testimony establishes that Tojo’s alternative methods of forming the ceramic composite layer would necessarily produce pores with a tortuosity sufficient to block dendrite growth.

As to the use of evaporation of a solvent to form pores, Dr. White testified as follows:

Q. Okay. How would one create tortuous pores in a ceramic composite layer?

...

THE WITNESS: I think we talked about the formation of pores before the break. And I mentioned that it was possible to form such pores by evaporation of a solvent that had been used to form the paste that was used to form the ceramic composite layer on the micropore separator.

Ex. 1033, 81:12–21.

As to whether tortuous pores would block dendrite growth, Dr. White testified as follows:

Q. Okay. Under what circumstances would a separator having pores be able to block a dendrite from growing through the pores?

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A. The answer to that question would depend upon the characteristics of the separator as a whole. If the separator as a whole has characteristics such that the path for the dendrite through the pores and the separator would be long and tortuous, for example, it could be a very thick separator, it could be a separator with pores that are not straight-through pores, then it would be possible for such a separator to block dendrite growth.

*Id.* at 40:2–14.

Thus, Dr. White's deposition testimony advanced by Petitioner establishes, at best, that it is possible that tortuous pores could form using Tojo's technique, and that it is also possible under the proper circumstances that those pores could be sufficiently tortuous to block dendrite growth. As discussed above, however, inherency must necessarily, not possibly, result from the prior art disclosure. *In re Cruciferous Sprout Litig.*, 301 F.3d at 1349.

In sum, for the reasons discussed, Petitioner does not persuade us that it has shown, by a preponderance of the evidence, that Tojo describes inherently a separator with a ceramic composite layer adapted to at least block dendrite growth and prevent electronic shorting, as claim 1 requires. Because we determine that Petitioner has not shown that Tojo describes a separator having all of the features required by claim 1 and its dependent claims 2, 3, 5, 6, and 11, we find that Petitioner has not established

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that claims 1–3, 5, 6, and 11 are unpatentable under 35 U.S.C. § 102(b) as anticipated by Tojo.

*C. Claims 4, 7–10, and 12: Obviousness over Tojo*

Petitioner challenged claims 4, 7–10, and 12 of the '586 patent in the Petition as either anticipated or obvious over Tojo. Pet. 14. We instituted trial as to claims 4, 7–10, and 12 based on Petitioner's obviousness challenge to those claims under 35 U.S.C. § 103(a) over Tojo. Dec. to Inst. 30.

When evaluating claims for obviousness, “the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved.” *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966)). Secondary considerations, if present, also must be considered. *Id.*

We take into consideration both parties' assertions regarding the level of ordinary skill when evaluating the parties' contentions regarding the scope and content of the prior art, and the differences between the prior art and the challenged claims. In that regard, both experts generally agree that an ordinarily skilled artisan at the critical time would have had a degree in chemistry, physics, material science, or chemical engineering, at least three years of experience in the battery industry or research and development of lithium batteries, and knowledge of the components and problems of lithium batteries, including dendrite growth, electronic shorting, and separators. Ex. 1003 ¶¶ 18–20 (Abraham Decl.); Ex. 2002 ¶ 76 (White

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Decl.). We note also that the level of ordinary skill in the art may be evidenced by the cited references. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Claim 4 depends from claim 1 and includes claim 1's requirement that the separator be adapted to at least block dendrite growth and prevent electronic shorting. Claim 12 recites that limitation expressly. Ex. 1001, 6:18–20.

As discussed above, Petitioner does not persuade us that it has established that Tojo's separator includes that feature, because of the pores in Tojo's ceramic composite layer. Because Petitioner relies on this limitation being inherently present in Tojo as argued with respect to claim 1 (Pet. 19, 23), Petitioner does not provide any evidence to support the obviousness of this limitation. In the context of an obviousness analysis, inherency “may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *In re Oelrich*, 666 F.3d 578, 581 (C.C.P.A. 1981) (quoting *Hansgirk v. Kemmer*, 102 F.2d 212, 214 (CCPA 1939)). An inherent disclosure is one that is “sufficient to show that *the natural result flowing* from the operation as taught would result in the performance of the questioned function.” *Id.*; *Par Pharm., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1195 (Fed. Cir. 2014) (“[T]he concept of inherency must be limited when applied to obviousness, and is present only when the limitation at issue is the ‘natural result’ of the combination of prior art elements.”) (quoting *In re Oelrich*, 666 F.2d at 581). As discussed above, the preponderance of the evidence leads us to conclude that Tojo's disclosure would

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not necessarily produce pores with a tortuosity sufficient to block dendrite growth. Thus, even if an ordinary artisan were to find it obvious to try one of the specific matrix materials recited in dependent claim 4 (*id.* at 19), the resulting ceramic composite layer required by both claim 4 and claim 12 would, nonetheless, have the pores that Tojo teaches should be present in that layer. Therefore, a preponderance of the evidence does not support a finding that it would have been obvious that the separator disclosed by Tojo would result in a separator having the dendrite-blocking feature required by claims 4 and 12.

Accordingly, because Petitioner has not shown that Tojo teaches or suggests all of the features required by claims 4 and 12, we conclude that Petitioner has not established by a preponderance of the evidence that claims 4 and 12 are unpatentable under 35 U.S.C. § 103 as obvious over Tojo.

Regarding independent claim 7, and claims 8–10 which depend therefrom, Petitioner relies upon the structural limitations of the ceramic composite layer, the polyolefinic microporous layer, and the inorganic particles shown to be present in Tojo with regard to claims 1–3. Pet. 20; *see id.* at 14–18. Regarding the matrix materials specified by claims 7 and 10, Petitioner asserts they would have been obvious (*id.* at 18–19) over Tojo’s disclosure that resin binders are “used conventionally” (Ex. 1004 ¶ 22), “not particularly limited” (*id.*), and the specifically identified “urethane” (*id.* ¶ 31) and “rubbers” (*id.* ¶ 22). Petitioner argues that one of ordinary skill in the art would envisage polyethylene oxide (recited in claims 7 and 10) from Tojo’s



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disclosure of “various rubbers.” Pet. 18, 21 (citing Ex. 1004 ¶ 22, Ex. 1003 ¶¶ 52–53). Regarding the matrix material taught by Tojo, the Abraham Declaration states “Tojo provides that the resin binder is not restricted” and that polyethylene is an “example[] of rubber or rubber type polymers.” Ex. 1003 ¶¶ 52–53. Petitioner also relies upon the Abraham Declaration to demonstrate that Tojo discloses overlapping ranges with the porosity, average pore size, and Gurley Number ranges claimed in claims 7 and 8. Pet. 21-22 (citing Ex. 1004 ¶¶ 15, 29; Ex. 1003 ¶¶ 54-58, 60-63).

Patent Owner contends that one of ordinary skill in the art would not envisage polyurethane from the disclosure of urethane in Tojo because urethane is not mixed with inorganic particles in the embodiment disclosed in paragraph 31 of Tojo. PO Resp. 35–36 (citing Ex. 2002 ¶¶ 127–129). Patent Owner also contends that polyethylene oxide and polyacrylonitrile are neither rubbers nor “conventionally used as binders for combination with inorganic microparticles” in the battery industry in 2000. *Id.* at 36 (citing Ex. 2002 ¶¶ 127–131, Ex. 2015 ¶¶ 29–30). Patent Owner further argues that it would not have been obvious to try the claimed matrix materials in Tojo’s separator because “[t]he selection of a polymer for use in a cell is not a simple matter.” *Id.* at 36–37. Citing the Declaration of C. Glen Wensley, Ph.D. (Ex. 2015 ¶¶ 18–22), Patent Owner asserts that multiple material properties are involved in the selection of a binder and that Petitioner has not explained why one skilled in the art would have been led to the particularly claimed binders other than the identified species/genus relationship. PO Resp. 37–38.

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Patent Owner does not point to any clear or specific evidence supporting its assertion that one of ordinary skill in the art would understand Tojo's disclosure of resin materials to be so restrictive that a resin in an embodiment that does not include inorganic particles would not be an obvious choice for use as a resin in the embodiment containing inorganic particles. Tojo explicitly states that the resin in its embodiment with inorganic particles preferably acts as a binder and the binder "is not particularly limited." Ex. 1004 ¶ 22. Regarding polyethylene oxide in particular, which is recited in claims 7 and 10, Dr. Wensley states

Under certain circumstances polyethylene oxide may be blended with or grafted to different kinds of rubbers, such as butyl rubbers. Although those blended or grafted materials would be considered rubbers, polyethylene oxide on its own would not be considered a rubber.

Ex. 2015 ¶ 29. Patent Owner does not assert on this record that such rubber type polymers are not resins, conventionally used as binders, or used in lithium batteries. The evidence in the trial record is that polyethylene oxide was being used in lithium batteries in the 2000 time frame, but not in a commercial product. Ex. 1030, 100:3–101:17. Petitioner asserts that the prosecution history of the '586 patent confirms polyethylene oxide, polyvinylidene fluoride, polytetrafluoroethylene, and polyurethane were in use as matrix materials in the prior art. Reply 11–12 (citing Ex. 1002; Ex. 1039, 4:1–19).

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Based on the trial record, the preponderance of the evidence establishes that it would have been obvious to select the matrix material claimed in claims 7 and 10 in view of Tojo's broad disclosure of suitable resins and various rubbers, in particular. In a determination of obviousness, a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art. *Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807 (Fed. Cir. 1989). It is not limited to specific examples contained in its disclosure. *In re Mills*, 470 F.2d 649, 651 (CCPA 1972).

Patent Owner does not dispute the calculations presented by Dr. Abraham concerning the porosity, average pore size, and Gurley Number ranges disclosed by Tojo overlapping with the ranges claimed in claims 7 and 8. Given Dr. Abraham's qualifications and experience (Ex. 1003 ¶¶ 3–17), we credit his testimony on this issue (*id.* ¶¶ 54–63, 65).

In sum, having considered the prior art advanced by Petitioner in light of Patent Owner's arguments and evidence regarding its teachings, we find that the preponderance of the evidence is that an ordinarily skilled artisan would have been prompted to use known polymers for the matrix materials broadly described by Tojo in the ceramic composite layer. Accordingly, on this record, we conclude that an ordinary artisan would have had reason to prepare a separator having all of the features of claims 7–10.

*Appendix B**D. Claims 1–6 and 11: Obviousness  
over Tobishima and Tojo*

Petitioner challenged claims 1–12 of the '586 patent in the Petition as obvious over the combination of Tobishima and Tojo. Pet. 26. We instituted trial as to claims 1–6 and 11. Dec. to Inst. 30.

Patent Owner contends that there is no reason to combine Tojo with Tobishima because the references propose different solutions to different problems. PO Resp. 41. Patent Owner argues further that addition of Tojo's inorganic particles to Tobishima's separator would reduce the conductivity of the separator by displacing the electrolyte in the separator's impregnated polymer layer (*id.* at 43), as well as inhibiting the crosslinking of Tobishima's gel-like film (*id.* at 46).

For the reasons below, we conclude that Petitioner has shown by a preponderance of the evidence that the combination of Tobishima and Tojo describes a separator and battery that encompass all of the limitations in claims 1–6 and 11.

Tobishima describes a separator in a rechargeable lithium battery that has a two-layered structure:

- (1) a porous polyolefin polymer film with a melting point of 180°C or lower, a thickness of 20 to 100 µm and a porosity of 30% or greater is used in combination with

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(2) a 20 to 150  $\mu\text{m}$  thick polymer film having a polymer matrix allowing trapping and impregnation of nonaqueous solvent and ion dissociative lithium salt.

Ex. 1005 ¶ 6 (paragraphing added). Tobishima discloses that the minimum thickness of the polymer matrix film is 20  $\mu\text{m}$  in order to prevent internal shorts due to “penetration by dendritic lithium.” *Id.* ¶ 11. The preferred maximum thickness of 150  $\mu\text{m}$  is in view of the design condition that “too great a thickness will lead to the problem of reducing the charge capacity of the cathode and anode of the cell and lowering the energy of the cell.” *Id.* The stated advantages of the cell are:

(A) [it] does not develop internal shorts due to dendritic lithium deposition even when charging and discharging are repeated over a long period of time, making it possible to achieve a long charge/discharge cycle life and also making it possible to avoid risks such as ignition due to internal shorts; and

(B) in the event of external shorts or charging with excessive current, in order to avoid the dangerous situation where lithium melts inside the cell, the component materials of the separator melt rapidly at a temperature below the melting point of lithium (180°C), and thus function to cause clogging and block electric current, making it possible to avoid further temperature increase.

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*Id.* ¶ 8 (paragraphing added).

Petitioner contends that Tobishima teaches all of the features required by claim 1 except for the microparticles in the matrix material. Pet. 26–31. Petitioner further contends that it would have been obvious to one of ordinary skill in the art to combine the microparticles of Tojo with the polymeric matrix material of Tobishima because Tobishima “suggests the need of increasing the mechanical strength of the electrolyte solution impregnated polymer layer . . . providing a motivation for combining with the strength-enhancing microparticles of Tojo” (*id.* at 28 (citing Ex. 1005 ¶ 11; Ex. 1003 ¶ 84)). Petitioner further asserts that the microparticles of Tojo are combinable with Tobishima’s polymeric matrix “because Tojo teaches any conventional binders—including ‘various polyesters, various polyolefins, various rubbers, and various acrylic resins[’]—may be mixed with the microparticles.” *Id.* (citing Ex. 1004 ¶¶ 22, 31, Ex. 1003 ¶¶ 82–84).

Regarding claim 2, which is directed to the weight percent in the mixture of inorganic particles and matrix material, Tojo teaches a mixture weight ratio of 500 parts or less of binder to 100 parts of inorganic microparticles. Ex. 1004 ¶ 22; Pet. 32. Regarding claim 3, Tojo teaches aluminum oxide, silicon dioxide, and titanium dioxide as examples of the inorganic microparticles. Ex. 1004 ¶ 18; Pet. 32. Regarding the matrix materials of claim 4, Tobishima discloses polyacrylonitrile, polyethylene oxide, and polymethacrylate. Ex. 1005 ¶ 11. Regarding claims 5 and 6, which are directed to the microporous layer, Tobishima discloses polyolefinic films including a polyethylene film. *Id.* ¶¶ 10, 12, 16; Pet. 33.

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Regarding the rechargeable lithium battery of claim 11 that requires any one of the separators of claims 1 through 10, Tobishima discloses a rechargeable lithium battery having an anode, a cathode, and an electrolyte solution. Ex. 1005, Abstr., ¶ 2; Pet. 36-37.

Patent Owner asserts that modifying Tobishima's polymer matrix with Tojo's inorganic particles for the reason of improving mechanical strength of the separator presumes Tojo and Tobishima are referring to the same meaning of mechanical strength. PO Resp. 44 (citing Ex. 2002 ¶¶ 139-140; Ex. 2016, 534-35). According to Patent Owner, the mechanical strength that Tobishima describes being improved by polymer crosslinking would be "thought of as mechanical stability or dimensional stability, such that a film made of the compound would be free standing." *Id.* (citing Ex. 1005 ¶ 11). Patent Owner contends that Tojo, on the other hand, "is not at all concerned with enhancing the dimensional stability of an electrolyte impregnated polymer film" but, rather, "the hardness of the surface protection layer" which is improved by adding inorganic particles that are preferably hard. *Id.* at 46 (citing Ex. 1004 ¶ 18).

Patent Owner also asserts that "simply adding inorganic particles to a gel polymer does not in all cases improve mechanical strength of the gel polymer" and may even make a film "fragile" if too little or too much is added. *Id.* at 45 (citing Ex. 2002 ¶¶ 141-142; Ex. 1027, 1252). Patent Owner also argues that a person of ordinary skill in the art would not add inorganic particles to a polymer before crosslinking because crosslinking would be inhibited. *Id.* (citing Ex. 2002 ¶¶ 141-143). Patent Owner

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further argues that the addition of inorganic particles to Tobishima's gel-like film "would result in a substance similar to wet glue with sand in it." *Id.* at 46 (citing Ex. 2002 ¶ 141).

Both Tobishima and Tojo refer to "mechanical strength" as a property to be optimized in the polymer matrix of their respective separators. Ex. 1005 ¶ 11; Ex. 1004 ¶ 7. Tobishima provides crosslinking of the polymer as an optional means for increasing mechanical strength; Tojo provides a separator having a mixture of inorganic particles in a resin as another means for improving mechanical strength. *Id.* Patent Owner lists many aspects of mechanical strength of a polymer that can be tested, affected, and improved. PO Resp. 44 (citing Ex. 2016, 534–35). Even if one skilled in the art reading Tobishima would understand "crosslinking" to teach or suggest mechanical stability or dimensional stability specifically, the term "mechanical strength" itself has a broader meaning according to Patent Owner. Moreover, Tobishima provides crosslinking as one way the polymer material "may be modified." Ex. 1005 ¶ 11 ("to increase mechanical strength, the polymer materials used may be modified to have a cross-linked structure.") Thus, Tobishima is not limiting in terms of how the mechanical strength of the polymer may be increased nor does it require crosslinking as a necessary step.

Regarding the issue of adding inorganic particles to a polymer in an amount that is too little or too much to improve mechanical strength, the person having ordinary skill in the art must be regarded as skillful and ordinarily creative, not as a mere literalistic automaton. *Transocean*



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*Offshore Deepwater Drilling, Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296, 1304 (Fed. Cir. 2010); *In re Sovish*, 769 F.2d 738, 742 (Fed. Cir. 1985). Moreover, the article that Patent Owner cites for showing various effects caused by the addition of inorganic particles acknowledges that the addition of inorganic particles affects whether the combination yielded a free standing film. Ex. 1027, 1253 (“The use of ceramic makes it possible to prepare a highly conductive, freestanding film . . .”).

In sum, having considered the prior art advanced by Petitioner in light of Patent Owner’s arguments and evidence regarding the cited references’ teachings, we find that an ordinarily skilled artisan would have been prompted to combine Tojo’s inorganic particles in the polymer matrix of Tobishima. Accordingly, the preponderance of the evidence on this trial record shows that an ordinary artisan would have had reason to prepare a separator having all of the features of claims 1–6 and a battery having all of the features of claim 11.

*E. Secondary Considerations*

Before concluding whether the challenged claims would have been obvious, in addition to the teachings in the prior art, the objective indicia of nonobviousness must be considered “as part of all the evidence, not just when the decision maker remains in doubt after reviewing the art.” *Eurand, Inc. v. Mylan Pharms. Inc. (In re Cyclobenzaprine Hydrochloride Extended–Release Capsule Patent Litig.)*, 676 F.3d 1063, 1076–77 (Fed. Cir. 2012) (citation omitted).

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Although Petitioner bears the ultimate burden of persuasion under 35 U.S.C. § 316(e), as Petitioner contends (Reply 18), “[f]or objective evidence to be accorded substantial weight, its proponent [Patent Owner] must establish a nexus between the evidence and the merits of the claimed invention.” *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). In particular, the objective indicia “must be tied to the novel elements of the claim at issue” and must “be reasonably commensurate with the scope of the claims.” *Institut Pasteur & Universite Pierre Et Marie Curie v. Focarino*, 738 F.3d 1337, 1347 (Fed. Cir. 2013) (quoting *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013)).

As noted above, the prior art evidence of obviousness teaches or suggests separators having all of the features required by claims 1–11. Accordingly, we consider the objective evidence of nonobviousness as it relates to claims 1–11.

Patent Owner contends that objective evidence of nonobviousness shows that the claimed separator solved a long-felt need (PO Resp. 48–50), was copied by Petitioner, the alleged infringer in one of the copending district proceedings (*id.* at 50–53), achieved wide industry acceptance (*id.* at 53–56), and experienced significant commercial success (*id.* at 56–60).

Petitioner replies, essentially, that Patent Owner has failed to establish adequately a nexus between the objective indicia advanced by Patent Owner and the subject matter recited in the claims. Reply 21–25. Petitioner also contends

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that Patent Owner has incorporated excessive argument into its Response from its supporting documents. *Id.* at 15–16.

As to incorporation by reference, 37 C.F.R. § 42.6(a)(3) states that “[a]rguments must not be incorporated by reference from one document into another document.”

To show a nexus between the claims and the objective evidence of nonobviousness, Patent Owner relies on testimony by Dr. White from one of the copending district court proceedings noted above, to show that Petitioner’s allegedly infringing product contains all of the features of the claims. *See* PO Resp. 53, 57. Specifically, in addition to the Declaration by Dr. White prepared for this proceeding (Ex. 2002), Patent Owner cites to a Declaration by Dr. White submitted in support of Patent Owner’s motion for preliminary injunction in the copending district court litigation (Ex. 2903 (“White PI Declaration”)). PO Resp. 53, 57.

As Petitioner contends, Patent Owner cites to numerous paragraphs of the White Declaration prepared for this proceeding, but does not, in its Response, discuss with any specificity the information and arguments presented in that Declaration. *See* PO Resp. 53 (citing Ex. 2002 ¶¶ 166–209); *id.* at 57 (same). The White Declaration itself, in turn, cites extensively to additional evidence, including a Declaration by Premanand Ramadass (Ex. 2907), which was also prepared to support Patent Owner’s motion for preliminary injunction in the copending infringement proceeding. Ex. 2002 ¶¶ 188, 190–95, 201.

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Patent Owner also cites to Exhibits 13, 17, and 21 of the White PI Declaration (Ex. 2903). PO Resp. 53, 57. Exhibits 13, 17, and 21 of the White PI Declaration contain extensive claims charts and analysis. *See* Ex. 2903, Exhibit 13, 1–8; *id.* at Exhibit 17, 1–11; *id.* at Exhibit 21, 1–20. As to claims 1–11 at issue here, only claims 1, 4, and 7 are discussed, which occurs at pages 1–7 of Exhibit 13 of the White PI Declaration, at pages 1–7 of Exhibit 17 of the White PI Declaration, and at pages 1–13 of Exhibit 21 of the White PI Declaration.

In its Patent Owner Response, however, Patent Owner does not discuss with any specificity the information or arguments presented in the two Declarations by Dr. White, the accompanying claim charts, or the accompanying Declaration by Mr. Ramadass. Accordingly, Patent Owner’s Response improperly incorporates by reference the arguments and claims analysis from both of Dr. White’s Declarations, as well as the Declaration by Mr. Ramadass.

Even disregarding the procedural infirmities in Patent Owner’s Response, however, Petitioner persuades us that the evidence of secondary considerations is not entitled to substantial weight, because Patent Owner has not established a sufficient nexus between the merits of the claimed subject matter and that evidence. Petitioner persuades us also that the evidence of secondary considerations is not reasonably commensurate in scope with the claimed subject matter.

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Patent Owner relies on the district court's order granting a preliminary injunction to show that Petitioner's allegedly infringing product, on which Patent Owner bases most of its contentions regarding secondary considerations of obviousness, includes all of the features of the challenged claims. PO Resp. 57 (citing (Ex. 2904 ("PI Order"))).

The PI Order mentions only claim 1 of the '586 patent. *See* Ex. 2904, 8 ("Having reviewed [the] description of the claims detailed [in] the claim charts, it appears likely that the SRS [safety reinforced separators] sold, offered for sale, used, and imported into this country by defendants infringes at least claim 1 of the '586 patent."). As noted above, the objective evidence of nonobviousness is pertinent to claims 1–11. Moreover, on appeal of the PI Order, the Federal Circuit found that the district court had not made adequate findings of fact regarding infringement, and remanded the case back to the district court. *Celgard, LLC v. LG Chem, Ltd.*, No. 2014-1675, 2015 WL 4757745, at \*3, \*6 (Fed. Cir. Aug. 12, 2015).

As to the issue of long-felt but unsolved need, Patent Owner focuses entirely on the problem of dendrite growth. PO Resp. 48–50. Patent Owner acknowledges two proposed solutions existed, Tobishima (Ex. 1005) and Song<sup>4</sup> (Ex. 2011), but asserts "there is no evidence that either works." PO Resp. 50 (citing Ex. 2002 ¶ 149). Song, however, states "[t]he use of continuous or non-

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4. J.Y. Song et al., *Review of gel-type polymer electrolytes for lithium-ion batteries*, 77 J. POWER SOURCES 183–197 (1999) (Ex. 2011) .

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porous polymeric membranes which provide few or no continuous free paths for electrolyte solution in which lithium dendrites propagate has been one of several successful approaches to suppressing the problem of dendrite growth.” Ex. 2011, 1. The White Declaration does not refute that the Song approach was successful at blocking dendrite growth. Instead, Dr. White states that the solution proposed by Song does not “suggest[] applying a ceramic coating to solve the dendrite issue.” Ex. 2002 ¶ 149.

Accordingly, we agree with Petitioner that Patent Owner has not shown a sufficient nexus between the claimed subject matter and the evidence of long-felt but unsolved need in view of an existing solution to the problem of dendrite growth that claims 1–6 also solve. In addition, Patent Owner has not explained adequately how the separators recited in claims 7–11 meet that need, given that none of those claims requires the separator to be capable of blocking dendrite growth. Thus, Patent Owner has not advanced evidence adequate to support a finding that claims 1–11 of the ’586 patent solved a long-felt, unsolved need.

Regarding the issue of copying, Patent Owner contends that it had a business relationship with Petitioner, in which Patent Owner provided base separator material to Petitioner, and Petitioner applied a ceramic coating to that material, thereby practicing the claimed invention. PO Resp. 52–53 (citing Ex. 2915 ¶¶ 6–10, 12, 15, 16 (Paulus Decl.)). Patent Owner contends that, after switching to a different base film supplier, “[r]ather than develop a new

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product, [Petitioner] merely copied its old SRS products it developed with [Patent Owner] and which infringe the '586 patent. Thus, this secondary consideration favors a finding of non-obviousness." *Id.* at 53.

As to Patent Owner's contentions regarding copying, we find that Petitioner has the better position. The Federal Circuit has explained that "[n]ot every competing product that arguably falls within the scope of a patent is evidence of copying; otherwise, 'every infringement suit would automatically confirm the nonobviousness of the patent.'" *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) (quoting *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004)). Rather,

copying requires evidence of efforts to replicate a specific product, which may be demonstrated through internal company documents, direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a replica, or access to the patented product combined with substantial similarity to the patented product.

*Id.*

Further, as Petitioner argues, Patent Owner did not provide a ceramic coated separator to Petitioner (product, prototype, or otherwise), but, rather, Petitioner provided its separator technology to Patent Owner. Reply 18–19 (citing Ex. 2907 ¶ 4; Ex. 1043 ¶ 8–10). Petitioner also argues that meetings with Patent Owner concerned

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only Patent Owner’s base film, not a ceramic coated separator. *Id.* at 19 (citing Ex. 1043 ¶ 11). Patent Owner’s evidence of receiving “customized specifications” and “production requirements” from Petitioner is consistent with Petitioner’s argument that the supply of technology went from Petitioner to Patent Owner rather than the other way around. *See* Ex. 2915 ¶¶ 9–10.<sup>5</sup>

Moreover, in testifying that the product asserted as infringing claims 1, 4, and 7 includes all of the claimed features, Dr. White noted that the ceramic composite layer of the allegedly infringing product is expressly described as being porous. Ex. 2903, Exhibit 17, 1, 3 (White PI Decl.). In contrast, as noted above, the ’586 patent describes its ceramic composite layer as nonporous, except for some pores that may result from contact with electrolyte. Ex. 1001, 3:10–12.

Given this significant difference in the description of the ceramic composite layer of the ’586 patent, as compared to that of Petitioner’s allegedly infringing product, Petitioner persuades us that Patent Owner has not advanced evidence adequate to support a finding that Petitioner copied the product described in the ’586 patent.

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5. In reaching our decision, we have considered the evidence set forth in Patent Owner’s Motion for Observation on the Cross-Examination of Petitioner’s Reply Witness Jongmoon Chin (Paper 63) and Petitioner’s Response (Paper 67). At best, Patent Owner’s observations characterize Mr. Chin’s deposition testimony as identifying potential opportunities where information about Celgard’s separator know-how could have been obtained. In addition, we agree with Petitioner that Patent Owner’s observations are argumentative and that they assume evidence not in the record.



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As to the issue of industry praise and acceptance, Patent Owner advances the testimony of Mr. Paulus as evidence that, as of 2013, about 46% of all plug-in electric vehicles in the United States used batteries with ceramic coated separators, that that figure was 70.8% when calculated by megawatt hour, that about 56% of all plug-in electric vehicles sold in the United States having a ceramic-coated battery separator were supplied by Petitioner, LG Chem, and that Petitioner, LG Chem, supplies batteries to 26% of all plug-in vehicles sold in the United States that use a lithium-ion battery. PO Resp. 54 (citing Ex. 2915 ¶¶ 21–24 (Paulus Decl.)). Moreover, Patent Owner contends, “[i]ndustry participants have adopted advertising materials touting the benefits of and importance of ceramic coating on safety and more specifically in the prevention of dendrite growth.” *Id.* at 55–56 (citing Ex. 2002 ¶¶ 160, 162, 216–222; Ex. 2901; Ex. 2902; Ex 2903 at Exhibit 11; Ex. 2912).

As Petitioner contends (Reply 23–24), certain of the advertising documents advanced by Patent Owner point to numerous features, aside from the dendrite blocking and short prevention, as desirable properties of the advertised lithium ion batteries. *See* Ex. 2903, Exhibit 11 (LG Chem website noting that the “lithium-ion batteries of LG Chem’s Mobile Battery Division have outstanding competitiveness in terms of high capacity, ultra slimness, and safety”); Ex. 2912, 1–2 (LG Chem Power Inc. website noting the reliability, cost, power density, energy density, light weight, and environmental friendliness of its lithium-ion batteries). Moreover, as noted above, claims 7–11 do not require the ceramic composite layer to be adapted

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to at least block dendrite growth and prevent electronic shorting, the safety features that Patent Owner contends provide the basis for the cited advertising documents, as well as the alleged industry praise and acceptance. Accordingly, viewing the totality of the record on this issue, Patent Owner has not advanced evidence adequate to establish a sufficient nexus, or commensurateness of scope, between the subject matter recited in claims 1–11, and the evidence of industry praise and acceptance.

As to commercial success, Patent Owner again relies on evidence relating to its relationship with Petitioner LG Chem. Specifically, Patent Owner contends, Patent Owner saw “a huge increase in sales once [Petitioner] started practicing the ’586 patent.” PO Resp. 57. More specifically, Patent Owner contends, before its relationship with Petitioner, Patent Owner sold only \$10,000,000 worth of base separator material, whereas from 2009 to mid-2013, Patent Owner sold \$100,000,000 worth of separator material to Petitioner for ceramic coating and use in electric vehicles. *Id.* (citing Ex. 2915 ¶ 21 (Paulus Decl.)). Patent Owner contends that Petitioner has stated that it annually sells approximately \$2.4 billion of infringing batteries worldwide. *Id.* at 58 (citing Ex. 2002 ¶ 213–14; Ex. 2910; Ex. 2911). Patent Owner reiterates its contentions, noted above, regarding Petitioner’s share of the plug-in hybrid battery market. *Id.* (citing Ex. 2915 ¶¶ 23, 24).

Patent Owner contends that the asserted commercial success of Petitioner’s allegedly infringing products “is attributable, at least in part to the novel feature of the ’586 patent -- the ability of the ceramic layer to block

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dendrite growth.” *Id.* As evidence, Patent Owner directs us to marketing and other statements by Petitioner, which Patent Owner contends advertise the safety of Petitioner’s separators. *Id.* (citing Ex. 2002 ¶¶ 216–222; Ex 2903, Exhibit 11; Ex. 2912; Ex. 2913). Moreover, Patent Owner contends, “that the commercial success of [Petitioner’s] products is attributable at least in part to the SRS technology is shown by the fact that the ceramic coating increases cost of the total battery and adds mass to the battery and thus decreases driving range,” which are negatives that [Petitioner] would not add to its separators absent some economic benefit. *Id.* at 60 (citing Ex. 2002 ¶¶ 223–24; Ex. 2915 ¶ 26).

As Petitioner contends (Reply 24–25), the advertising documents advanced by Patent Owner point to a number of features, aside from dendrite blocking and short prevention, as desirable properties of the advertised lithium ion batteries which are not claimed by the ’586 patent. *See* Ex. 2903, Exhibit 11 (LG Chem website noting that the “lithium-ion batteries of LG Chem’s Mobile Battery Division have outstanding competitiveness in terms of high capacity, ultra slimness, and safety”); Ex. 2912, 1–2 (LG Chem Power Inc. website noting the reliability, cost, power density, energy density, light weight, and environmental friendliness of its lithium-ion batteries). Petitioner also advances evidence that Patent Owner’s commercial success analysis is flawed because additional economic and market factors are responsible for the success of its lithium ion batteries, including the increased demand for electric vehicles and lithium ion batteries generally, the ability to leverage earnings from

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business divisions to expand its battery business, financial assistance from federal and local governments, marketing, and supply chain relationships. Reply 25 (citing Ex. 1047 ¶¶ 16–23).

Moreover, Patent Owner does not explain with any specificity how or why claims 7–11 require the recited separators to contain ceramic particles of the type and concentration required to provide the dendrite-blocking functionality asserted as the basis for Petitioner’s commercial success. *See* PO Resp. 59 (citing Ex. 2002 ¶ 221<sup>6</sup>) (“The extremely high amount of nanoceramic used in . . . [Petitioner’s] SRS products leads to tiny, tortuous pores and a layer that is adapted to block dendrite growth—a key element for safe lithium-ion batteries.”).

In sum, viewing the totality of the record on this issue, we agree with Petitioner that Patent Owner has not advanced evidence adequate to establish a sufficient nexus, or commensurateness of scope, between the subject matter recited in claims 1–11, and the evidence of commercial success.

*F. Conclusion on Obviousness*

As discussed above, having considered the prior art advanced by Petitioner in light of Patent Owner’s arguments and evidence regarding the cited references’ teachings, Petitioner persuades us, based on the teachings

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6. We understand Patent Owner’s citation to paragraph 2221 of the White Declaration (Ex. 2002) to refer to paragraph 221 instead.

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in Tojo alone and in combination with Tobishima, that an ordinary artisan would have been prompted to prepare a separator having all of the features of claims 1–11. As also discussed above, having considered Patent Owner’s evidence and arguments regarding objective indicia of nonobviousness, Petitioner persuades us that Patent Owner’s evidence does not show a sufficient nexus, or commensurate scope, between the subject matter recited in claims 1–11 and the objective indicia.

Accordingly, under these circumstances, taking into consideration the record as a whole, we conclude that Petitioner has shown by a preponderance of the evidence that an ordinary artisan would have considered the separators recited in claims 1–6 as obvious in view of Tobishima and Tojo, the separators recited in claims 7–10 as obvious in view of Tojo, and the battery recited in claim 11 as obvious in view of Tobishima and Tojo.

**III. MOTIONS TO EXCLUDE***A. Petitioner’s Motion to Exclude*

Petitioner moves to exclude all or portions of Exhibit 2002 (White Declaration), Exhibit 2015 (Wensley Declaration), and Exhibit 2915 (Paulus Declaration) for lacking personal knowledge under FRE 602. Petitioner further objects to Exhibit 2002 as lacking relevance to Dr. White’s expertise under FRE 702 and 703 and constituting improper patent law testimony under 37 C.F.R. § 42.65. Petitioner also moves to exclude Exhibits 2008, 2009, 2900–2902, 2905–2907, 2910, 2912–2914, and

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2916 as inadmissible hearsay under FRE 801 and 802 and Exhibits 2500, 2501, 2904–2906, 2908–2914, and 2916 as irrelevant under FRE 401 and 402 as not cited or relied upon by Patent Owner in this proceeding. Paper 58, 1. As the movant, Petitioner has the burden of proof to establish that it is entitled to the requested relief. *See* 37 C.F.R. § 42.20(c). For the reasons stated below, Petitioner’s Motion to Exclude is *denied*.

*1. Exhibit 2002 (White Declaration)*

Petitioner seeks to exclude the White Declaration or paragraphs 56, 58, 59, 61, 63–65, 147, 157, 159, 161, 202, 210, 216, 221, 223, and 224 of the White Declaration because Dr. White lacks personal knowledge of the matters asserted therein. Paper 58, 2–3. Petitioner also asserts that Dr. White is not qualified to evaluate financial data or determine whether a product has experienced commercial success to provide the opinions expressed in paragraphs 210, 216, and 224. *Id.* at 4. Petitioner further asserts that paragraphs 150, 152, 153, 156, 163, 165, 167, 206, 207, and 209 should be excluded because they relate to patent law practice (nonobviousness, infringement, and preliminary injunctions). *Id.* at 5.

Patent Owner contends that the cited paragraphs relay legal findings that provide context for Dr. White’s opinions. Paper 70, 2–3. Patent Owner also contends that information relevant to the nexus between the claimed invention and the commercial success of Petitioner’s separator product is consistent with Dr. White’s role in this proceeding in connection with the issue of obviousness. *Id.* at 2.

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We deny Petitioner's Motion to exclude the disputed testimony. Dr. White is not offered as a legal expert in this proceeding. We understand his testimony regarding the legal parameters as context in which he provides his opinions concerning the technology, and have given it the appropriate weight.

*2. Exhibit 2015 (Wensley Declaration)*

Petitioner seeks to exclude the Wensley Declaration, because Dr. Wensley lacks personal knowledge of the matters asserted in paragraphs 23, 24, and 26, as well as the corresponding paragraphs of Exhibit 2002 (¶¶ 118, 119, 121, 137, 143) and Patent Owner's Response (pages 34, 35, 37, 43).<sup>7</sup> Paper 58, 10–11.

Patent Owner contends that Dr. Wensley has extensive experience with a wide variety of membrane materials and polymers as set forth in his Declaration (Ex. 2015) and curriculum vitae (Ex. 2017). Paper 70, 8–9. On this basis Patent Owner asserts that the identified evidence should not be excluded because Dr. Wensley has personal knowledge and his testimony is consistent with the role of an expert witness. *Id.*

Given Dr. Wensley's experience (*see* Ex. 2015 ¶¶ 2–7; Ex. 2017), we agree with Patent Owner that Dr. Wensley qualifies to testify as an expert regarding the subject matter at issue and, therefore, deny Petitioner's Motion to exclude his Declaration.

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<sup>7</sup> Petitioner cites Paper 34, which is the redacted version of Patent Owner's Response. The unredacted version is Paper 32.

*Appendix B**3. Exhibit 2915 (Paulus Declaration)*

Petitioner seeks to exclude the Paulus Declaration because Mr. Paulus does not have personal knowledge of the matters asserted in paragraphs 6, 8, 12–15, 18–24, and 26 and includes speculative statements (¶¶ 6, 15, 18) inconsistent with FRE 602. Paper 58, 11–12.

Patent Owner contends that “in the ordinary course of performing his job, Mr. Paulus gained first-hand knowledge of the facts contained within the challenged paragraphs of his declaration” and he states in his declaration that he has “personal knowledge of the matters set forth in [his] declaration, except where otherwise indicated.” Paper 70, 9–10.

Petitioner provides no clear basis for refuting Mr. Paulus’s express statement. That Mr. Paulus might not have provided documentary support for all of his testimony goes to his credibility and to the ultimate weight to be accorded to the disputed testimony, and is not an adequate basis for exclusion. Accordingly, we deny Petitioner’s Motion to Exclude the Paulus Declaration.

*4. Exhibits 2008, 2009, 2900–2902, 2905–2907, 2910, 2912–2914, and 2916 (Inadmissible Hearsay)*

Petitioner seeks to exclude Exhibits 2008, 2009, 2900–2902, 2905–2907, 2910, 2912–2914, and 2916 as inadmissible hearsay because Dr. White, Patent Owner, and/or Mr. Paulus relies upon them to provide the truth of the matters asserted therein. Paper 58, 7. Petitioner asserts that no hearsay exception applies because an



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expert such as Dr. White may testify to opinions based on inadmissible hearsay, but may not transmit hearsay to the Board. *Id.* at 10 (citing *Triboro Quilt Mfg. Corp. v. Luve LLC*, 2014 WL 1508606, at \*7 (S.D.N.Y. Mar. 18, 2014)).

Patent Owner contends that Exhibits 2008, 2009, 2900–2902, 2905–2907, 2910, 2912–2914 and 2916 are not hearsay because it is proper for Dr. White, as an expert in this case, to rely upon inadmissible facts so long as experts in a particular field would reasonably rely on the same facts and Petitioner makes no argument that the exhibits are untrustworthy or inaccurate. Paper 70, 6. Regarding Exhibit 2907 (Ramadass Declaration),

Patent Owner asserts that it does not constitute an out of court statement subject to exclusion as hearsay because a deposition of Mr. Ramadass was not secured by Petitioner. *Id.* at 6–7. Even if the Declaration is hearsay, Patent Owner argues that Exhibits A and B thereto fall into the exception of business records as confirmed in the Ramadass Declaration. *Id.* at 7. Regarding Exhibits 2905, 2906, 2910–2912, and 2914, Patent Owner asserts they are not hearsay because they are statements of a party-opponent under FRE 801 and are the sort of information commonly relied upon by experts under FRE 703. *Id.* at 8.

We agree with Patent Owner on this issue. As Patent Owner contends, FRE 703 allows the proponent of the expert opinion to disclose the evidence underlying an expert opinion to the jury if the “probative value in helping the jury evaluate the opinion substantially outweighs [its] prejudicial effect.”

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As evidenced by the discussion on the merits above, we find that these exhibits have substantial probative value in helping us to evaluate Dr. White's opinion. Moreover, because the Board is not a lay jury, and has significant experience in evaluating expert testimony, the danger of prejudice in this proceeding is considerably lower than in a convention district court trial.

In sum, for the reasons discussed, we deny Petitioner's Motion to Exclude Exhibits 2008, 2009, 2900–2902, 2905–2907, 2910, 2912–2914, and 2916.

*5. Exhibits 2500, 2501, 2904–2906, 2908–2914,  
and 2916 (Relevance)*

Petitioner seeks to exclude these exhibits as unrelated to the technology at issue and/or the patent at issue. Paper 58, 5–6.

Patent Owner contends that Exhibits 2904–2906, 2908–2914, and 2916 are directly relevant to secondary considerations of non-obviousness because they are supporting evidence to the district court's decision concerning infringement and Petitioner advances no argument of prejudice. Paper 70, 3–4. Patent Owner also asserts that Exhibits 2500 and 2501 are not specifically argued in Petitioner's motion to exclude, but are also relevant to the understanding of one of ordinary skill in the art at the time of the invention. *Id.* at 4 n.2.

Because Dr. White attests that he reviewed Exhibits 2904–2906 and 2908–2913 in reaching the opinions he

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expressed in this case, Petitioner has not shown that they are irrelevant under FRE 401 and 402. Because Exhibits 2914 and 2916 also relate to the marketing of Petitioner's lithium ion battery, Petitioner also has not shown adequately that they are irrelevant. Accordingly, we decline to exclude Exhibits 2904–2906, 2908–2914, and 2916. Regarding Exhibits 2500, and 2501, because Petitioner bears the burden on its Motion to Exclude these exhibits and fails to explain why they are not relevant, we also decline to exclude Exhibits 2500 and 2501.

*B. Patent Owner's Motion to Exclude*

Patent Owner moves to exclude all or portions of Exhibit 1003 (Abraham Declaration), Exhibit 1031 (Second Abraham Declaration), and Exhibit 1047 (Vander Veen Declaration) under FRE 402, 403, 602, 702, 703, 801, and 802.<sup>8</sup> Patent Owner also moves to exclude Exhibits 1004 (Tojo translation) and 1033–1037 as unfairly prejudicial under FRE 402 and 403 (as well as FRE 901 with regard to the reliability of the Tojo translation). Paper 64, 1. As the movant, Patent Owner has the burden of proof to establish that it is entitled to the requested relief. *See* 37 C.F.R. § 42.20(c). For the reasons stated below, Patent Owner's Motion to Exclude is *denied*.<sup>9</sup>

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8. We have considered the evidence set forth in Patent Owner's Motions for Observation on the Cross-Examinations of Drs. Abraham and Vander Veen (Papers 61 and 62) in reaching our decisions on Patent Owner's Motion to Exclude as they relate to the Abraham and Vander Veen Declarations.

9. Because we deny Patent Owner's motion on the merits, we decline to decide whether Patent Owner's objections were identified with sufficient particularity. *See* Paper 69, 1–3.

*Appendix B**1. Exhibits 1003 and 1031 (Abraham Declarations)*

Patent Owner seeks to exclude Exhibits 1003 and 1031 on the basis that Dr. Abraham did not “perform a correct legal analysis in providing his opinions on anticipation and obviousness related to claims 1-6 and 11-12 of the ’586 patent” (Paper 64, 2) and “because he has no legal foundation for his analysis or conclusions that claims 1-12 of the ’586 patent are obvious” (*id.* at 5). Patent Owner contends that Dr. Abraham did not apply or explain the meaning of claim constructions for the ’586 patent. *Id.* at 3–5. Patent Owner also contends that Dr. Abraham “improperly looks to the ’586 patent as support for his combination” and “does not explain why a POSITA would use certain compounds.” *Id.* at 7. Patent Owner further asserts that Dr. Abraham did not apply properly secondary considerations of nonobviousness nor the correct legal standards for inherency. *Id.* at 9–10.

Petitioner asserts that Patent Owner failed to preserve its objections because it failed to provide notice with “sufficient particularity” in accordance with 37 C.F.R. § 42.64. Paper 69, 1. Petitioner contends that listing the applicable Federal Rule of Evidence with a parenthetical describing its purpose is insufficient notice. *Id.* at 2 (quoting Ex. 2934). Petitioner also asserts that Patent Owner’s argument goes to the weight of Dr. Abraham’s testimony, rather than its admissibility. *Id.* at 3. Petitioner further asserts that Dr. Abraham’s testimony was consistent with the Board’s conclusion on claim construction and that his testimony is properly based on technical issues in the case. *Id.* at 3–5. Regarding the reason to combine the prior art, Petitioner points to Dr. Abraham’s Declaration and deposition testimony as

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showing the reason for combining comes from the prior art itself and not the '586 patent. *Id.* at 6. (citing Ex. 1003 ¶¶ 78–84; Ex. 2929, 185:12–15).

We deny Patent Owner's Motion to Exclude Dr. Abraham's Declarations (Exhibits 1003 and 1031). We are not persuaded that any potential deficiency in Dr. Abraham's understanding of the legal concepts of unpatentability warrants excluding his testimony entirely. *See Nutrition 21 v. United States*, 930 F.2d 867, 871 n.2 (Fed. Cir. 1991) ("An expert's opinion on the ultimate legal conclusion is neither required nor indeed 'evidence' at all.") (citation omitted). Patent Owner also does not persuade us that Dr. White's alleged failure to apply a claim construction consistent with the Board's warrants exclusion of his testimony. Indeed, Patent Owner does not explain adequately how adoption of a particular claim construction would have changed the technical aspects of his testimony. Moreover, the alleged deficiencies in Dr. Abraham's analysis go to the weight to be accorded his testimony rather than its admissibility. Lastly, as noted above, because the Board, unlike a lay jury, has significant experience in evaluating expert testimony, the danger of prejudice in this proceeding is considerably lower than in a conventional district court trial.

In sum, for the reasons discussed, we deny Patent Owner's Motion to Exclude Dr. Abraham's testimony.

*Appendix B**2. Exhibit 1047 (Vander Veen Declaration) and Exhibits 1048–1061*

Patent Owner seeks to exclude the Vander Veen Declaration on the basis that it is conclusory and is disconnected from any issue in the case because it did not consider the factors of commercial success, did not analyze the '586 patent or claims, and Dr. Vander Veen did not understand the issue of whether there is a nexus between the patented technology and LG Chem's success. Paper 64, 12–14. Patent Owner further asserts that the Vander Veen Declaration should be excluded as untimely because evidence pertaining to commercial success and other objective indicia of nonobvious was available to Petitioner at the time it filed its Petition. *Id.* at 14. Patent Owner also argues that Exhibits 1048–1061 should be excluded as inadmissible hearsay because they are not authenticated. *Id.*

Petitioner contends that the Vander Veen Declaration noted Dr. Abraham's opinions on the lack of nexus, set forth factors analyzed by economists to determine commercial success, and analyzed those factors to the available data. Paper 69, 9 (citing Ex. 1047 ¶¶ 27, 11–32). Regarding Exhibits 1048–1067, Petitioner asserts that Patent Owner fails to show that any are not of a type reasonably relied upon by experts in Dr. Vander Veen's field. *Id.* at 11. Petitioner further asserts that the exhibits are selfauthenticating because they bear the appearance, contents, substance and circumstances to support a finding that the thing is what its proponent claims it is, such as Exhibit 1048, which is Dr. Vander Veen's curriculum vitae. *Id.* at 12 (citing FRE 901(a)).

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We agree with Petitioner and deny Patent Owner's Motion to Exclude Dr. Vander Veen's Declarations and Exhibits 1048–1067 thereto.

*3. Exhibit 1004 (Tojo Translation)*

Patent Owner seeks to exclude, under FRE 402, 403, and 901, the Tojo translation and Dr. Abraham's reliance on it because the translation materially differs from the translation in co-pending IPR2014-00679 (Ex. 2011). Paper 64, 10–12.

The translation of Tojo in the instant proceeding was accompanied by the required translator affidavit, as Petitioner contends. Paper 69, 7–8; Ex. 1004.<sup>10</sup> The fact that certain terms might not have been translated in precisely the same manner in the co-pending proceeding does not persuade us that the translation of record in this proceeding is substantively inaccurate. Patent Owner does not direct us to any specific evidence, other than the differences in the translations, suggesting that the translation is inaccurate. Accordingly, we deny Patent Owner's Motion to Exclude the Tojo translation (Ex. 1004).

*4. Exhibits 1033–1037 (Unfairly Prejudicial)*

Patent Owner seeks to exclude Exhibit 1033 because it is a deposition transcript of Patent Owner's expert taken in a separate proceeding, its use in this proceeding is

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10. Petitioner incorrectly cites Ex. 1015, which is a certified translation of JP 11-67273 not JP 11-80395.

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outside the agreement of the parties, and it is irrelevant to this proceeding. Paper 64, 15. Patent Owner also seeks to exclude Exhibits 1034–1037 as exceeding the scope of a reply because it introduces new evidence with Dr. Abraham’s second Declaration (Ex. 1031) to demonstrate the knowledge of a POSITA, which should have been presented previously at the time of the Petition. *Id.* at 14–15 (citing Ex. 1003 ¶¶ 49, 52–53; Ex. 1031 ¶ 27).

Petitioner contends that the deposition transcript of Dr. White is appropriate for a reply because it contradicts his previously-made Declaration. Paper 69, 13. Petitioner further asserts that Patent Owner made Exhibit 1033 publicly available in a co-pending proceeding and cannot control the use of publicly available documents. *Id.* at 14. Petitioner also contends that Exhibits 1034–1037 are responsive to Dr. White’s declaration (Ex. 2002) concerning the conventional use of PEO and PVDF as gel polymer electrolyte separators. *Id.* at 12 (citing Ex. 1035 ¶ 27).

We agree with Petitioner and deny Patent Owner’s Motion to Exclude Exhibit 1033.

**IV. CONCLUSION**

Petitioner has shown, by a preponderance of the evidence, that claims 1–11 of the ’586 patent are unpatentable on the following grounds:

(1) Claims 7–10 under 35 U.S.C. § 103(a) as obvious over Tojo; and



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(2) Claims 1–6 and 11 under 35 U.S.C. § 103(a) as obvious over Tobishima and Tojo.

Petitioner has not shown, by a preponderance of the evidence, that claims 1–6, 11, and 12 of the '586 patent are unpatentable based on the following grounds:

(1) 1–3, 5, 6, and 11 under 35 U.S.C. § 102(b) as anticipated by Tojo; and

(2) Claims 4 and 12 under 35 U.S.C. § 103(a) as obvious over Tojo.

**V. ORDER**

In consideration of the foregoing, it is

ORDERED that claims 1–11 of the '586 patent are determined to be *unpatentable*;

FURTHER ORDERED that Petitioner's Motion to Exclude is *denied*;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *denied*; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

**APPENDIX C — DENIAL OF REHEARING OF THE  
UNITED STATES COURT OF APPEALS FOR THE  
FEDERAL CIRCUIT, FILED FEBRUARY 17, 2017**

UNITED STATES COURT OF APPEALS  
FOR THE FEDERAL CIRCUIT

2016-1218

IN RE: CELGARD, LLC,

*Appellant.*

Appeal from the United States Patent and Trademark  
Office, Patent Trial and Appeal Board in No. IPR2014-  
00692.

**ON PETITION FOR PANEL REHEARING  
AND REHEARING *EN BANC***

Before PROST, *Chief Judge*, NEWMAN, LOURIE, DYK,  
MOORE, O'MALLEY, REYNA, WALLACH, TARANTO, CHEN,  
HUGHES, and STOLL, *Circuit Judges*.

PER CURIAM.

**ORDER**

Appellant Celgard, LLC filed a combined petition for panel rehearing and rehearing *en banc*. The petition was referred to the panel that heard the appeal, and thereafter the petition for rehearing *en banc* was referred to the circuit judges who are in regular active service.

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Upon consideration thereof,

IT IS ORDERED THAT:

The petition for panel rehearing is denied.

The petition for rehearing *en banc* is denied.

The mandate of the court will issue on February 24, 2017.

FOR THE COURT

February 17, 2017  
Date

/s/ Peter R. Marksteiner  
Peter R. Marksteiner  
Clerk of Court