

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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EDMUND OPTICS, INC.,  
Petitioner,

v.

SEMROCK, INC.,  
Patent Owner.

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Case IPR2014-00599  
Patent 7,119,960 C1

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Before WILLIAM A. CAPP, TRENTON A. WARD, and  
DAVID C. McKONE, *Administrative Patent Judges*.

CAPP, *Administrative Patent Judge*.

Opinion concurring-in-part and dissenting-in-part filed by WARD,  
*Administrative Patent Judge*

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

Edmund Optics, Inc. (“Edmund”) filed a Corrected Petition (Paper 5, “Pet.”) requesting *inter partes* review of claims 33–36, 39–41, 44, and 45 of U.S. Patent No. 7,119,960 C1 (Ex. 1001, the “’960 patent”).<sup>1</sup> We instituted an *inter partes* review of claims 33–36, 39–41, 44, and 45, of the ’960 patent. Paper 9. After institution of trial, Semrock, Inc. (“Semrock”) filed a Patent Owner’s Response (Paper 20, “PO Resp.”) and Edmund filed a Reply (Paper 27, “Reply”). This case is before the Board for a Final Written Decision following an Oral Hearing conducted May 21, 2015, the transcript for which is entered as Paper 70 (“Tr.”).<sup>2</sup>

Also before the Board are the following matters:

1. Semrock’s Contingent Motion to Amend [Papers 21, 28, and 32];
2. Edmund’s Motion to Exclude Evidence [Papers 51, 59, and 63];
3. Semrock’s Motion to Exclude Evidence [Papers 46, 52, 58, and 64]; and
4. Edmund’s Objection to the scope of Semrock’s Reply to Petitioner’s Opposition to Patent Owner’s Contingent Motion to Amend [Paper 32, 40].

After considering the evidence and arguments of counsel and for the reasons set forth below, we determine that Edmund has NOT met its burden

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<sup>1</sup> The ’960 Patent is the subject of litigation captioned *Semrock, Inc., v. Edmund Optics, Inc.*, 13-cv-06265-DGL-JWF, currently pending in the United States District Court for the Western District of New York.

<sup>2</sup> After the oral hearing, we requested post-hearing briefing from the parties regarding the burden of proof applicable to establishing enablement of non-patent, printed publication prior art references in an *inter partes* review proceeding. Paper 67. In response thereto, Semrock and Edmund each filed post-hearing briefs on said issue. Papers 68, 69.

of showing, by a preponderance of the evidence, that claims 33–36, 39–41, 44, and 45 of the '960 patent are unpatentable.

## I. BACKGROUND

### A. *The '960 patent (Ex. 1001)*

The '960 patent, titled Method of Making High Performance Optical Edge And Laser-Line Filters And Resulting Products, is a continuation-in-part of U.S. 7,068,430 C1 (the '430 patent).<sup>3</sup> Whereas the '430 patent is directed to disclosing and claiming improved edge filters, the '960 patent adds new matter to the disclosure of the '430 patent directed to improved multi-layer, thin-film, laser-line filters. Ex. 1001, claim 33. The filters have a transparent substrate such as glass with opposing, flat, parallel, planar sides. *Id.* at 17:46–52. The substrate supports a plurality of layers comprising alternating layers of materials having either: (1) a relatively high refractive index; or (2) a relatively low refractive index, respectively. *Id.*

The specification has separate sections directed to: (A) an Apparatus for Making Optical Edge and Laser-Line Filters (8:39–10:2); (B) Methods of Making the Improved Edge Filters and Laser-Line Filters (10:3–17:44); (C) The Improved Filters (17:46–18:28); and (D) Applications of the Filters (21:24–60). The specification includes six examples. Ex. 1001, 18:28–20:15. The first two examples are directed to edge filters and the final four examples are directed to laser-line filters. The '960 patent has claims directed to: (1) a method of manufacture of filters (*e.g.*, claims 1, 12, 30);

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<sup>3</sup> The '430 patent is the challenged patent in IPR2014-00583, between the same parties. A copy of the '430 patent is of record in that *inter partes* review proceeding as Exhibit 1001.

(2) an optical analysis system (*e.g.*, claims 7, 20, 25); and (3) laser-line filters (*e.g.*, claims 24, 32, 33).

The apparatus disclosed in Section A of the specification includes a computer-controlled deposition system. Ex. 1001, 8:39–50. The apparatus includes an ion beam sputtering deposition system that uses a beam assist source for depositing hard coatings. *Id.* The apparatus also includes an integral optical monitoring system to monitor deposition of the optical coating materials. *Id.* A data processor, responsive to signals from the monitoring system, processes these signals and uses them to control the deposition process. *Id.* 9:64–10:2.

The method of making the laser-line filters disclosed in Section B of the specification includes using a data processor to instruct the apparatus when to stop depositing each layer of the filter. *Id.* 10:3–11. Disclosed laser-line filter embodiments are based on a single-substrate, with hard coatings on one or both sides of the substrate. *Id.* at 16:30–35. The laser-line filters are based on a multi-cavity Fabry-Perot type coatings to define the pass-band and blocking section near the passband. *Id.* at 16:35–37.

The “Improved Filters” disclosed in Section C of the specification have the general structure schematically illustrated in Fig. 3B, reproduced below. *Id.* at 17:45–48.

**Fig. 3B**

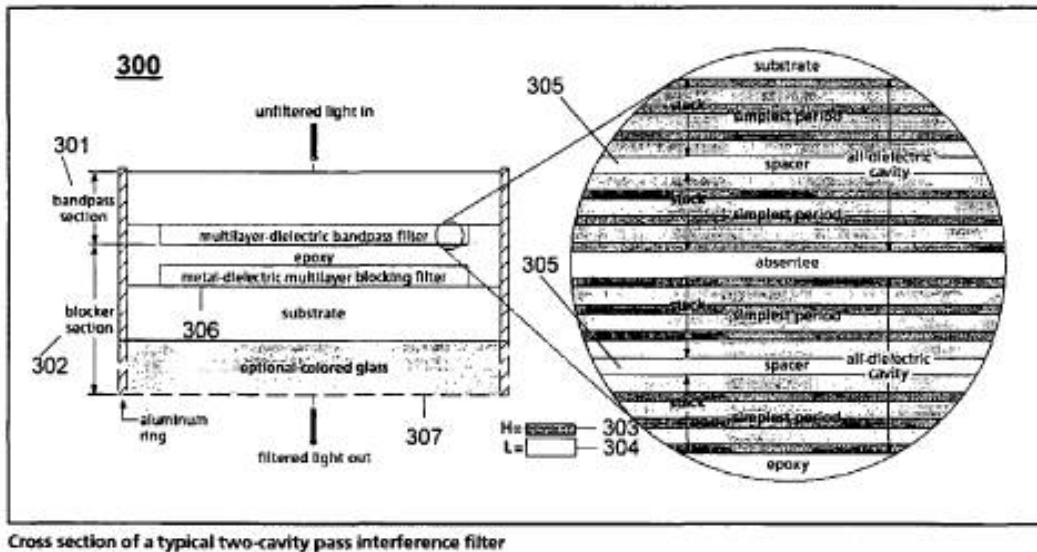


Figure 3B, shown above, is a schematic drawing illustrating the structure of a conventional laser-line filter. *Id.* at 7:66–67. The filter includes bandpass section 301 that comprises a sequence of dielectric layers forming a sequence of Fabry-Perot multilayer cavities combined with coupling layer spacers between them. *Id.* 6:11–37. Each Fabry-Perot cavity comprises alternating layers of high index material 303 and low index material 304. *Id.* 6:34–35. Most layers have a thickness of one quarter wavelength at the passband center wavelength. *Id.* 6:16–17. When such quarter-wave stacks are coupled to one another with an intervening half-wavelength cavity layer 305 of high or low index material, a Fabry-Perot cavity is formed and a narrow, high transmission passband is opened in the center of the stopband region. *Id.* 6:17–24.

When multiple Fabry-Perot cavities are combined with coupling layers between them, the narrow passband region achieves a more rectangular passband shape, with steeper edges and a wider, flatter region of high transmission. *Id.* 6:24–28. The specification states that the improved

laser-line filters made by the disclosed processes exhibit increased transmission, steepness, and blocking in the vicinity of the passband over prior art laser-line filters. *Id.* 18:24–27.

### *B. Illustrative Claim*

Edmund challenges claims 33–36, 39–41, 44, and 45, all of which are directed to multi-layer, thin-film, laser-line filters. Claim 33, reproduced below, is an independent claim:

33. A multi-layer, thin-film laser-line filter exhibiting a transmission of greater than 90%, a full-width at half-maximum passband of at least  $0.0031 \lambda_c$ , and a blocking of optical density greater than 5 for wavelengths from  $1.01\lambda_c$  to  $1.1\lambda_c$  and from  $0.92\lambda_c$  to  $0.99\lambda_c$ , wherein  $\lambda_c$  is a wavelength in nm of a laser directed through the filter.

### *C. The Asserted Grounds of Unpatentability*

Edmund challenges claims 33–36, 39–41, 44, and 45 of the '960 patent based on the alleged grounds of unpatentability set forth in the table below, as further supported by the Declaration of Professor Angus Macleod<sup>4</sup> (Ex. 1011) and the Declaration of Mr. Uwe Schallenberg (Ex. 1012).

<b>Reference(s)</b>	<b>Basis</b>	<b>Claims challenged</b>
Macleod (Ex. 1002) <sup>5</sup>	§102	33
Macleod	§103	33–36, 39–41, 44, and 45

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<sup>4</sup> Professor Angus MacLeod (hereinafter “Professor MacLeod”) is the author of the MacLeod Treatise (Ex. 1002).

<sup>5</sup> H.A. Macleod, THIN-FILM OPTICAL FILTERS (Taylor & Francis Group, 3rd ed. 1986) (the “MacLeod Treatise”).

## II. CLAIM INTERPRETATION

In our Decision to Institute, we construed “thin-film, laser-line filter” as broad enough to encompass both soft and hard coated filters. Paper 9, 7. Semrock sought rehearing, arguing that the term should be limited to hard coated filters. Paper 12. We denied Semrock’s request for rehearing, reiterating our earlier decision that Semrock’s specification does not make clear that the invention excludes soft coatings. Paper 16, 3.<sup>6</sup>

In its Patent Owner’s Response, Semrock maintains its earlier position that claim 33 is limited to hard-coated filters. PO Resp. 28. Semrock argues that the ’960 patent’s specification disavows filters that are fabricated from soft-coated materials. *Id.* Semrock argues that its disavowal requires that the challenged claims be limited to “hard coated” thin-film laser-line filters. *Id.*

In its Preliminary Response and Patent Owner’s Response, Semrock directs our attention to selected passages of the specification indicating that the inventive filters are made with hard coatings.

The filters thus provide performance exceeding that of the highest performing conventional soft-coating filters with a more robust and durable hard-coated structure.

Ex. 1001, 18:15–18; Paper 7, 9.

The [laser-line] filters according to this embodiment are based on a single-substrate approach, with hard coatings on one or both sides of the substrate. The filters are based on a multi-cavity Fabry-Perot type coating to define the passband and blocking section near the passband. Furthermore, additional blocking at wavelengths further away from the passband may be provided by one or more additional, strictly dielectric,

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<sup>6</sup> Neither party sought construction of any additional terms in their respective Patent Owner’s Response and Petitioner’s Reply.

coatings, where, advantageously, no metals are used. These one or more additional coatings are referred to herein as “extended blocking layers.”

Ex. 1001, 16:33–42. Paper 7, 9–10. Semrock also directs our attention to Table 2 from column 20 of the specification which is described as providing a summary of the performance characteristics of the inventive laser-line filters. Paper 7, 10; PO Resp. 29; Ex. 1001, 20:45–46. Table 2 recites a temperature dependence of  $<5 \text{ ppm}/^\circ \text{C}$  and  $<0.003 \text{ nm}/^\circ \text{C}$  at 532 nm. Ex. 1001, 20:63–64.

Semrock argues that known properties of Cryolite and zinc sulfide (“ZnS”) (soft-coating materials) do not satisfy the performance criteria of Table 2. Paper 7, 9–10. Semrock directs our attention to a passage in Edmund’s primary prior art reference, the MacLeod Treatise, as reciting coefficients of optical thickness as a function of temperature for ZnS soft coatings. Paper 7, 11, citing Ex. 1002, 344. Semrock argues that MacLeod’s recited coefficients of optical thickness as a function of temperature equate to a temperature dependence of greater than  $30 \text{ ppm}/^\circ \text{C}$  for ZnS coatings. PO Resp. 11. Semrock further argues that the specification explains that the performance data in Table 2 applies to all known manufactured and/or theoretically calculated laser-line filters associated with disclosed embodiments of the invention. PO Resp. 29.

Semrock faults Edmund for failing to provide a proposed construction or an underlying analysis on the hard versus soft coating claim construction issue in its Petition. Paper 7, 11. Semrock argues that Edmund’s Petition fails to identify properly how the challenged claims are to be construed, in contravention of 37 C.F.R. § 42.104(b)(3). Paper 7, 12. In view of this lack of a proposed construction, Semrock also argues that Edmund’s Petition fails



to identify the relevance of its evidence, in contravention of 37 C.F.R. § 42.104(b)(5). Paper 7, 12.

Semrock is correct that Edmund’s Petition provides no express underlying analysis to support a construction of “multi-layer, thin-film laser-line filter” that is broad enough to encompass soft-coated filters. Instead, Edmund’s Petition merely states that the terms in claim 33 of the ’960 patent do not require construction and should be afforded their ordinary and customary meaning. Pet. 5. This is acceptable practice for purposes of filing an IPR Petition. *See Office Patent Trial Practice Guide*, 77 Fed. 48756, 48764 (Aug. 14, 2012).<sup>7</sup>

In an *inter partes* review, claims are given their broadest reasonable interpretation consistent with the specification. *See* 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278 (Fed. Cir. 2015). Within this framework, terms generally are given their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). The “ordinary and customary meaning of a claim term” is that meaning that a person of ordinary skill in the art in question, at the time of the invention, would have understood the claim to mean. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). The Federal Circuit admonishes us that even under the broadest reasonable interpretation, the Board’s construction cannot be divorced from the specification and the record evidence. *See Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015). Rather, “claims should always be read in light of the

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<sup>7</sup> “Regarding the need for a claim construction, where appropriate, it may be sufficient for a party to provide a simple statement that the claim terms are to be given their broadest reasonable interpretation, as understood by one of ordinary skill in the art and consistent with the disclosure.” *Id.*

specification and teachings in the underlying patent.” *Id.* Thus, a construction that is unreasonably broad and does not reasonably reflect the plain language and disclosure will not pass muster. *See id.*

A claim construction analysis begins with, and is centered on, the claim language itself. *See Interactive Gift Express, Inc. v. Compuserve, Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001). In the instant case, claim 33 is directed to a “multi-layer, thin-film laser-line filter.” Ex 1001. The claim limitations all are directed to optical performance parameters. There is no mention of either “hard” or “soft” coatings in the claim itself. Indeed, there are no structural limitations of any kind recited in the claim other than the recital of a “multi-layer, thin-film laser-line filter” in the preamble. Ex. 1001.

The specification acknowledges that two basic types of thin-film edge filters and thin-film laser-line filters exist: those based on “soft coatings” and those based on “hard coatings.”

Two basic types of thin-film edge filters and thin-film laser-line filters exist: those based on ‘soft coatings’ and those based on ‘hard coatings,’ both of which are typically manufactured by an evaporation technique (either thermal evaporation or electron-beam evaporation).

Ex. 1001, 4:28–34. In view of the foregoing, the ordinary and customary meaning of thin-film, laser-line filter is not limited to filters with a hard coating.

Nevertheless, Semrock argues that the specification alters the ordinary and customary meaning of the term to filters with only hard coatings through claim scope disavowal in the specification. PO Resp. 30. Semrock relies on the case of *SciMed Life Systems, Inc. v. Advanced Cardiovascular Systems, Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001), for the proposition that where

the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside of the reach of the claims. PO Resp. 28.

There are two exceptions to the general rule that patent claims are given their ordinary and customary meaning to one of skill in the art when read in the context of the specification and prosecution history: (1) when a patentee sets out a definition and acts as his own lexicographer, or (2) when the patentee disavows the full scope of the claim term either in the specification or during prosecution. *See Hill-Rom Services, Inc., v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014). In the instant case, Semrock has not brought any language from the specification to our attention where Semrock purported to be its own lexicographer and defined “multi-layer, thin-film, laser-line filter” in a manner that excludes soft coatings, nor has Semrock provided any arguments regarding disavowal during prosecution.

This brings us to the question of whether Semrock disavowed claim scope in the specification. Semrock contends that a disclaimer applies when the patentee makes statements such as “the present invention is . . .” or “this invention . . .” in the specification. PO Resp. 28–29, *citing Netcraft Corp. v. eBay, Inc.*, 549 F.3d 1394, 1397–98 (Fed. Cir. 2008). However, “claims will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words of expressions of manifest exclusion or restriction.” *Martek Biosciences Corp. v. Nutrinova, Inc.*, 579 F.3d 1363, 1381 (Fed. Cir. 2009). We note that Semrock’s cited authority, *Netcraft, supra*, qualified its holding by stating that use of the phrase “the present invention” does not automatically limit the meaning of claim terms in all circumstances, and that such language must be read in the context of

the entire specification and prosecution history. *See Netcraft*, 549 F.3d at 1398.

In the instant case, the specification indicates that the invention has four aspects, each of which is discussed in a separate section: A) apparatus programmed to make improved optical edge and laser-line filters; B) the method of making the improved filters; C) the improved filters made by the method; and D) applications of the improved filters. Ex. 1001, 8:33–37.

In section A, which is related to an Apparatus for Making Optical Edge and Laser-Line Filters in Accordance with an Embodiment of the Invention, optical edge filters and laser-line filters of the invention are made using a computer-controlled deposition system with an integral optical monitoring system to monitor deposition. Ex. 1001, 9:21–46. The disclosed deposition apparatus is an ion beam sputtering deposition system. Ex. 1001, 8:44. The specification indicates that hard coating filters, in contrast with soft coating filters, may be manufactured by non-evaporation techniques such as ion-beam sputtering. Ex. 1001, 4:33–35. On the other hand, the specification explains that both soft and hard coating laser line filters can be manufactured by evaporation techniques, such as thermal evaporation or electron-beam evaporation. *Id.* at 4:28:28–32. Semrock’s proposed construction does not distinguish between hard coated filters made by ion-beam sputtering deposition processes and hard coated filters made by prior art evaporation deposition processes.

In section B, which is related to Methods of Making the Improved Edge Filters and Laser-Line Filters, the specification discloses the manner in which the data processor 414 controls the apparatus 400 via the deposition control system 408. *Id.* 10:5–17:28. The data processor 414 is programmed

to instruct the apparatus 400 when to stop depositing each layer of the filter being manufactured. *Id.* 10:9–11. Section B also discloses that the process of making a laser-line filter according to an embodiment of the invention is based on a single-substrate approach with “hard coatings on one or both sides of the substrate.” Ex. 1001, 16:33–35. This section of the specification discloses a plurality of embodiments, however, the differences among the various embodiments are directed to features other than whether coating materials are hard or soft. *Id.* at 16:30–17:28.

In section C, which is related to The Improved Filters, the specification discloses that filters of the invention provide performance exceeding that of the highest performing conventional soft-coating filters with a more robust and durable hard-coated structure. Ex. 1001, 18:15–18. The specification further discloses that the improved laser-line filters “made by the processes disclosed herein” exhibit increased transmission, steepness, and blocking over prior art laser-line filters. *Id.* at 18:19–28. The only processes disclosed in the specification involve ion beam sputtering, a process that is used only with hard coating materials. *Id.* 4:28–34.

The specification discloses four examples of laser-line filters. Ex. 1001, 19:18–20:3. The coating structures for the recited examples are given in Appendices C and D. *Id.* Appendices C and D recite alternating layers of Nb<sub>2</sub>O<sub>5</sub> and SiO<sub>2</sub>. *Id.* The specification describes these as hard oxide coating materials. Ex. 1001, 17:53–55.

In describing the performance of filters of the ’960 patent, the specification states that the inventive *edge filters* are made “exclusively” with hard oxide materials, which is contrasted with soft-coated filters. Ex. 1001, 38–44. The specification, however, makes no corresponding

express disclaimer that the inventive laser-line filters are made “exclusively” with hard coating materials.

After considering claim 33 in view of the specification, as a whole, we are not persuaded that the intrinsic record requires a departure from the plain and ordinary meaning of “multi-layer, thin-film, laser-line filters.” The standard for finding claim scope disavowal is exacting. *See GE Lighting Solutions, LLC v. Agilight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014). It is not enough that the only embodiments, or all of the embodiments, contain a particular limitation. *See Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1366 (Fed. Cir. 2012). Mere criticism of a particular embodiment encompassed in the plain meaning of a claim term is not sufficient to rise to the level of clear disavowal. *See Epistar Corp. v. Int’l Trade Comm’n*, 566 F.3d 1321, 1335 (Fed. Cir. 2009). Furthermore, even where a particular structure makes it “particularly difficult” to obtain certain benefits of the claimed invention, this does not rise to the level of disavowal of the structure. *See Spine Solutions, Inc. v. Medtronic Sofamor Danek USA, Inc.*, 620 F.3d 1305, 1315 (Fed. Cir. 2010).

It is the claims that define the metes and bounds of the patentee’s invention. *See Phillips*, 415 F.3d at 1313. Thus, the patentee is free to choose a broad term and expect to obtain the full scope of its plain and ordinary meaning unless the patentee explicitly redefines the term or disavows its full scope. *See Thorner*, 669 F.3d at 1366. Each claim does not need to cover every feature disclosed in a specification. *See Ventana Med. Sys., Inc. v. Biogenex Labs, Inc.*, 473 F.3d 1173, 1182 (Fed. Cir. 2006). When a claim addresses only some of the features disclosed in the specification, it is improper to limit the claim to other, unclaimed features.

*See id.* We do not read limitations from the specification into claims and we do not redefine terms. *See Thorner*, 669 F.3d at 1367.

In the instant case, there is good reason to reject Semrock's arguments for claim scope disavowal. Semrock's proposed construction narrowly targets only one aspect of the specification disclosure, namely, hard coating materials. The specification, however, describes the invention as a combination of using: (1) hard coating materials; (2) an ion beam sputtering deposition system; and (3) an optically monitored, computer controlled, deposition system. Ex. 1001, 8:41–50. The specification acknowledges that hard coating materials were known in the prior art, yet Semrock argues that its disavowal of claim scope relates only to using hard coating materials, without regard to the ion-beam sputtering and optically monitored, computer controlled, deposition aspects of the invention. *Id.* at 4:28–34.

In the instant case, all of the recited limitations in claim 33 are performance criteria. No structure is claimed. This is a strong indication that Semrock originally intended a broad claim scope so that the claim covered any multi-layer, thin film, laser-line filter that exhibited the recited performance characteristics.<sup>8</sup> Semrock could have limited the scope of the claim by reciting structural limitations, but chose not to. Semrock cannot

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<sup>8</sup> An *inter partes* review proceeding is limited to grounds of unpatentability that can be raised under 35 U.S.C. § 102 or 103 and only based on prior art patents and printed publications. 35 U.S.C. § 311(b). Thus, we do not reach the issue of whether claim 33 constitutes a “single means claim” that is subject to a patentability challenge under 35 U.S.C. § 112. *See In re Hyatt*, 708 F.2d 712, 714–715 (Fed. Cir. 1983) (a single means claim, which covered every conceivable means for achieving the stated purpose, was held nonenabling for the scope of the claim because the specification disclosed at most only those means known to the inventor).

now, through claim construction, rewrite its patent claims to suit its needs in this litigation. *See Nike, Inc. v. Wolverine World Wide, Inc.*, 42 F.3d 644, 647 (Fed. Cir. 1994). In view of the foregoing, we maintain our earlier construction and reiterate that “multi-layer, thin-film, laser-line filters” in claim 33 are not limited to hard-coated filters.

### III. ANTICIPATION BY MACLEOD

To anticipate a patent claim under 35 U.S.C. § 102, “a reference must describe . . . each and every claim limitation and enable one of skill in the art to practice an embodiment of the claimed invention without undue experimentation.” *Am. Calcar, Inc. v. Am. Honda Motor Corp.*, 651 F.3d 1318, 1341 (Fed. Cir. 2011) (citing *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009)). Anticipation of a patent claim is a question of fact. *See In re Montgomery*, 677 F.3d 1375, 1379 (Fed. Cir. 2012). As the party challenging the patentability of claim 33, Edmund bears the burden of proving anticipation by a preponderance of the evidence. *See* 35 U.S.C. § 316(e).

Whether a patent is invalid as anticipated is a two-step inquiry. *See Power Mosfet Tech., LLC. v. Siemens AG*, 378 F.3d 1396, 1406 (Fed. Cir. 2004). The first step requires construction of the claims. *Id.* The second step in the analysis requires a comparison of the properly construed claim to the prior art. *Id.*

#### *A. The MacLeod Treatise (Ex. 1002)*

Edmund relies on the MacLeod Treatise (Ex. 1002) as anticipating claim 33. Pet. 17–28. Edmund furnishes a claim chart that purports to read all of the limitations of claim 33 onto excerpts from the MacLeod Treatise.



*Id.* at 17–19. Edmund supports its case with declaration testimony from its expert, Professor MacLeod, author of the MacLeod Treatise. *Id.* at 22; Ex. 1011.

The MacLeod Treatise is a lengthy textbook. Ex. 1002.<sup>9</sup> Edmund submitted a 184 page excerpt from the treatise in support of its Petition, including Chapter 6 titled “Edge Filters,” Chapter 7 titled “Band-pass Filters,” and Chapter 8, titled “Tilted Coatings.” *Id.*<sup>10</sup> The Petition cites to pages 310–13 in Chapter 7 and sub-chapters 8.1 (pages 348–49) and 8.4 (pages 368–77) in its claim chart. Pet. 17–19.<sup>11</sup>

Pages 310–13 of the MacLeod Treatise describe an exemplary filter design whose theoretical performance is shown in Figure 7.26. Ex. 1002, 310–13. In mapping the elements of claim 33, Edmund relies on this filter design, which uses materials with indices of refraction of 2.35 for H and 1.35 for L. Pet. 20–22. According to Edmund’s expert, Professor MacLeod, the exemplary filter shown in Figure 7.26 is comprised of layers of Cryolite and ZnS. Ex. 1011 ¶ 42.

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<sup>9</sup> Edmund describes the MacLeod Treatise as a “standard text book.” Pet. 20.

<sup>10</sup> Edmund submitted an additional excerpt of the MacLeod Treatise in support of its Petitioner’s Reply. Reply 3, Ex. 1032.

<sup>11</sup> Edmund’s Petition fails to explain or articulate the relevance of sub-chapters 8.1 and/or 8.4 to the issues in this IPR proceeding. Accordingly, we assign these sub-chapters no weight in our decision. *See* 37 C.F.R. § 42.104(b)(5) (the Board may give no weight to evidence where a Petitioner has failed to state its relevance or identify specific portions of the evidence that support a challenge).

*B. Enablement of the MacLeod Treatise*

Semrock does not challenge Edmund's position that the design of Fig. 7.26 of the MacLeod Treatise is a soft-coated, multi-layer, thin-film, laser line filter that, at least in theory, nominally appears to exhibit the performance parameters recited in claim 33. Semrock disputes Edmund's case based on two arguments. First, Semrock argues that claim 33 is limited to hard-coated filters, a position that we have previously rejected for reasons discussed above in the claim construction section of this decision. Second, Semrock argues that the MacLeod Treatise example does not enable the invention of claim 33. PO Resp. 21, 19–22. "To serve as an anticipating reference, the reference must enable that which it is asserted to anticipate." *Elan Pharms., Inc. v. Mayo Found.*, 346 F.3d 1051, 1054 (Fed. Cir. 2003).

Semrock asserts that the example published in the MacLeod Treatise assumes ideal conditions where there is no transmission loss. PO Resp. 1. Semrock characterizes the transmittance curve in Figure 7.26 as merely "theoretical" and "hypothetical." PO Resp. 4, 14, 16, and 21. Semrock contends that claim 33, in contrast, recites the performance parameters of an actual filter. PO Resp. 2.

Semrock argues that the hypothetical/theoretical filter design disclosed in the MacLeod Treatise is not properly compared to the real/actual filters disclosed and claimed in the '960 patent. PO Resp. 1. Semrock argues that a person of ordinary skill in the art understands that an actual optical filter, as opposed to a hypothetical filter design, experiences less than 100 percent transmission. PO Resp. 4–5. Semrock's expert, Dr. Rancourt, testifies that a person of ordinary skill in the art understands that an actual multi-cavity filter based on ZnS and Cryolite would not achieve

the “lossless” transmission performance promised by theory. Ex. 2004 ¶ 85. Dr. Rancourt identifies a variety of sources of transmission loss, including losses attributable to: absorption (¶¶ 55, 57, 71, 90); scattering (¶¶ 55, 56, 87–90), and manufacturing tolerances (¶¶ 94–111). As an example of transmission losses experienced in an actual filter, Dr. Rancourt cites to a MacLeod-Richmond publication. Ex. 2004 ¶¶ 79–84; Ex. 2007.<sup>12</sup> Dr. Rancourt describes Exhibit 2007 as disclosing an example of a “real” ZnS and Cryolite filter that exhibited a transmittance of less than 90 percent, but whose design suggested a theoretical transmission of greater than 90 percent. Ex. 2004, ¶¶ 79–83.

The parties engage in a vigorous dispute over the amount of transmission loss that would be experienced in manufacturing a real ZnS/Cryolite filter from the hypothetical filter design of Figure 7.26. Edmund contends that the resulting transmission loss would be less than 10% and, therefore, a real filter manufactured in accordance with the hypothetical ZnS/Cryolite soft filter design of Figure 7.26 of the MacLeod Treatise would be expected to achieve a transmission of 90 percent or greater and, thus, within the scope of the transmission limitation of claim 33. Reply 1–8. Edmund supports its position with testimony from Professor MacLeod. *Id.* Professor MacLeod relies on a number of items of scientific literature to support his conclusion as to the amount of transmission loss that would be experienced in an actual filter. Ex. 1029 ¶¶ 15–27.<sup>13</sup> Essentially,

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<sup>12</sup> H.A. MacLeod & D. Richmond, *Moisture Penetration Patterns in Thin Films*, THIN SOLID FILMS, 37 (1976), 163–169. Ex. 2007.

<sup>13</sup> Professor MacLeod relies on Ahrens II (Ex. 1024), Czyzak (Ex. 1030), MacLeod Treatise (Ex. 1002), Tien (Ex. 1031), and Al-Douri (Ex. 2009).

Edmund's arguments and evidence do not deny that some loss occurs when considering an actual filter versus a theoretical design, Edmund merely advocates that any such loss would nevertheless allow an actual ZnS/Cryolite filter to achieve a performance of greater than 90 percent transmission as required by claim 33. Reply 8.

Semrock presents testimony from Dr. Rancourt that disputes the reliability of Professor MacLeod's testimony and supporting publications. *See* Ex. 2031 ¶¶ 25–55 (suggesting that Professor MacLeod is misled by a typographical error). Dr. Rancourt relies on different scientific publications than those relied by Professor MacLeod to conclude that real (as opposed to theoretical) ZnS/Cryolite filters are not capable of achieving a transmission of 90 percent. Ex. 2004 ¶¶ 58–70.<sup>14</sup>

### *C. Presumption of Enablement*

Semrock and Edmund disagree as to which party has the burden of proof to establish whether the MacLeod Treatise enables the invention of claim 33. In the first instance, the parties disagree as to whether the MacLeod Treatise is entitled to a presumption of enablement.

Semrock argues that a presumption of enablement should not apply in *inter partes* review proceedings due to the nature of the proceedings. PO Resp. 1–3. Semrock argues that *inter partes* review proceedings are different from both patent prosecution and district court litigation in that a

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*Id.* Professor MacLeod also criticizes the Siqueiros reference (Ex. 2006) relied on by Dr. Rancourt as unreliable. *Id.*

<sup>14</sup> Dr. Rancourt relies on Pulker I (Ex. 2011), Pulker II (Ex. 2012), Gibson (Ex. 2010), Kersten (Ex. 2013), Ahrens (Ex. 2008), MacLeod-Richmond (Ex. 2007)

Petitioner is required to identify “in writing and with particularity” the grounds on which a claim is challenged. *Id.*; 35 U.S.C. § 312(a)(3).

The MacLeod Treatise is a non-patent, printed publication. Edmund relies on *In re Antor Media Corp.*, 689 F.3d 1282, 1288 (Fed. Cir. 2012), for the proposition that a non-patent, printed publication is presumptively enabled for purposes of an anticipation analysis. Paper 69, 1. Semrock distinguishes *Antor Media* as being restricted to the context of patent prosecution. Paper 68, 3. The Court, in *Antor Media*, explained the underlying rationale for permitting a presumption of enablement during patent prosecution.

[A]n examiner, who has no access to experts or laboratories, is not in a position to test each piece of prior art for enablement in citing it, and requiring him to do so would be onerous, if not impossible. An examiner, therefore, is not required to anticipate every possible response to a rejection, including showing that a cited reference is enabling.

Consistent with the statutory frame-work and our precedent, we therefore hold that, *during patent prosecution*, an examiner is entitled to reject claims as anticipated by a prior art publication or patent without conducting an inquiry into whether or not that prior art reference is enabling. As long as an examiner makes a proper prima facie case of anticipation by giving adequate notice under § 132, the burden shifts to the applicant to submit rebuttal evidence of nonenablement.

*Antor Media*, 689 F.3d at 1289.

In the case of *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313 (Fed. Cir. 2003), the Federal Circuit held that an accused infringer should be entitled to have a district court presume the enablement of unclaimed material in a prior art patent asserted against a patentee. *Id.* at 1355. In *dicta*, the *Amgen* Court stated that its reasoning “might” also apply to prior art printed publications.

We note that by logical extension, our reasoning here might also apply to prior art printed publications as well, but as Sugimoto is a patent *we need not and do not so decide today*. *See id.* (emphasis added). Thus, the *Amgen* Court did not reach that issue in its decision. *See id.* District Courts are split on this issue. We note that at least one district court decision has held that a district court should presume that a prior art printed publication is enabled. *See Robocast, Inc. v. Apple Inc.*, 39 F. Supp. 3d 552, 565 (D. Del. 2014). Other district courts maintain otherwise. *See e.g., CA, Inc. v. Simple.com., Inc.*, 780 F. Supp. 2d 196, 250 (E.D.N.Y. 2009); *Matsushita Elec. Indus. Co. v. Samsung Electronics Co.*, 2006 WL 1794768, \*5 (D.N.J. June 26, 2006).

For the reasons discussed more fully below, we find that Semrock has presented evidence of non-enablement that is sufficient to rebut a presumption of enablement, if indeed there is one. Consequently, for purposes of this decision, we need not decide and do not reach the issue of whether a non-patent, printed publication is entitled to a presumption of enablement in an IPR proceeding.

#### *D. Extrinsic Evidence of Enablement*

As noted previously, even if a Petitioner is entitled to a presumption that a non-patent, printed publication is enabled, we find that Semrock's Patent Owner Response presents sufficient testimonial and documentary evidence through Dr. Rancourt to rebut a presumption that the MacLeod Treatise enables the invention of claim 33. Ex. 2004, ¶¶ 55–57, 71, 79–85, 87–90, 94–111). Thus, any such presumption essentially vanishes. *See Fed. R. Evid. 301; St Mary's Honor Center v. Hicks*, 509 U.S. 502, 508 (1993) (presumption drops from the case); *Aukerman Co. v. R.L. Chaides*

*Constr. Co.*, 960 F.2d 1020, 1037 (Fed. Cir.1992) (presumption completely vanishes upon the introduction of evidence sufficient to support a finding of the nonexistence of the presumed fact)

Semrock argues that, where a Patent Owner presents sufficient evidence to show that a reference is not enabled, a Petitioner is precluded from offering additional extrinsic evidence to overcome the Patent Owner's showing. Paper 68, 6. Semrock argues that *Amgen* stands for the proposition that a court should exclude prior art from an anticipation inquiry if the patentee presents persuasive evidence of non-enablement. PO Resp. 7, citing *Amgen*, 314 F.3d at 1355.

If a patentee presents evidence of nonenablement that a trial court finds persuasive, the trial court must then exclude that particular prior art patent in any anticipation inquiry, for then the presumption has been overcome.

*Id.* Semrock interprets *Amgen* as maintaining that a patent challenger is not permitted to present evidence of enablement to overcome a patentee's evidence of non-enablement. *Id.* Thus, according to Semrock, the only party that is permitted to introduce extrinsic evidence on the issue on enablement of a prior art anticipation reference is the Patent Owner.<sup>15</sup>

Edmund argues that a patent challenger may rely on extrinsic evidence to establish that a prior art, non-patent, printed publication enables a claimed invention. In support thereof, Edmund relies on, among other

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<sup>15</sup> Semrock filed a Motion to Exclude Evidence. Paper 52. However, in its motion to exclude, Semrock did not rely on the evidentiary exclusion theory articulated in its post-hearing brief on non-enablement to exclude Edmund's extrinsic evidence of enablement, both testimonial and documentary, submitted with Edmund's Petitioner's Reply. Paper 68.

things, the case of *Bristol-Meyers Squibb Co. v. Ben Venue Labs.*, 246 F.3d 1368, 1379 (Fed. Cir. 2001).

To be enabling, a prior art reference must sufficiently describe a claimed invention to have placed the public in possession of that invention. *In re Elsner*, 381 F.3d 1125, 1128 (Fed. Cir. 2004).

The proper test of a publication as a § 102(b) bar is “whether one skilled in the art to which the invention pertains could take the description of the invention in the printed publication and combine it with his own knowledge of the particular art and from this combination be put in possession of the invention on which a patent is sought.”

*Id.* quoting *In re LeGrice*, 301 F.2d 929, 939 (1962). The disclosure must be sufficient that a person of ordinary skill in the art can make the claimed invention without undue experimentation. *See id.* “The factors relevant to whether experimentation is undue are discussed in, e.g., *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).” *Sanofi-Sytnelabo v. Apotex, Inc.*, 50 F.3d 1075, 1085 (Fed. Cir. 2008).

Every patent application and reference relies to some extent upon the knowledge of persons skilled in the art to complement that disclosed in order that it be “enabling” within the meaning of § 112 and to satisfy the requirements of a reference under § 102. *See In re Wiggins*, 488 F.2d 538, 543 (CCPA 1973). A court may consider a secondary reference to show that a primary reference is, in fact, enabled. *See Elsner*, 381 F.3d at 1129; *In re Donohue*, 766 F.2d 531, 533 (Fed. Cir. 1985); *In re Samour*, 571 F.2d 559, 562 (CCPA 1978).

An IPR differs somewhat from District Court litigation in that, in District Court, a patent challenger is afforded discovery of the Patent Owner’s case before presenting its case at trial. In an IPR, however, a



Petitioner essentially presents its case-in-chief in its Petition, prior to institution of a trial and generally prior to any meaningful discovery by either party. The procedural differences between district court litigation and IPR proceedings raises the question, if extrinsic evidence such as secondary references or expert testimony is needed to show enablement of a primary reference, whether such evidence must be presented with the Petition or whether Petitioner may present such evidence at a later time in the proceedings, such as in its Reply to the Patent Owner's Response after institution of a trial. *See* 37 C.F.R. § 42.23(b). In this regard, Semrock argues that a Petitioner, in its Reply, cannot raise new issues, such as new evidence necessary to make out a prima facie case for the unpatentability of a claim. Paper 68, 7. Semrock contends that extrinsic evidence of enablement presented in a Reply would constitute "new evidence." *Id.* Semrock contends that such evidence is prohibited from being presented in a Petitioner's Reply, unless the Petitioner can show that the new evidence complies with the supplemental information rule of 37 C.F.R. § 42.123(b). *Id.*

This argument is unpersuasive. In the case of *Dynamic Drinkware, LLC v. National Graphics, Inc.*, – F.3d –, 2015 WL 5166366, \*5 (Fed.Cir. Sept. 4, 2015). the parties disputed whether a prior art reference was entitled to the filing date of its provisional application. The court held that the Petitioner did not have the burden of providing evidence relating to the provisional application until after the Patent Owner raised the issue. *Id.* Thus, it was not necessary for the Petitioner to prove, at the time of filing its Petition, that the reference was entitled to the filing date of its provisional application. *Id.*

Our *Office Patent Trial Guide* provides the following guidance on the scope of a Petitioner's Reply to a Patent Owner Response.

A reply may only respond to arguments raised in the corresponding opposition. § 42.23. While replies can help crystallize issues for decision, a reply that raises a new issue or belatedly presents evidence will not be considered and may be returned. The Board will not attempt to sort proper from improper portions of the reply. Examples of indications that a new issue has been raised in a reply include new evidence necessary to make out a prima facie case for the . . . unpatentability of an original . . . claim, and new evidence that could have been presented in a prior filing.

77 Fed. Reg. 48,767 (Aug. 14, 2012). If a Patent Owner, in its Patent Owner's Response, presents evidence and argument that a reference on which a grounds of unpatentability in an *inter partes* review Petition depends does not enable the claimed invention, evidence submitted by the Petitioner to rebut Patent Owner's evidence and argument of non-enablement falls within the permissible scope of a reply. This follows, in part, from our determination, *infra*, that the ultimate burden of persuasion on non-enablement of a prior art references belongs to the Patent Owner. Thus, we will allow Edmund to rebut Semrock's evidence of non-enablement with extrinsic evidence submitted in connection with its Petitioner's Reply.

Contrary to Semrock's position, we interpret *Amgen* consistent with our holding here. We interpret the Federal Circuit's reference in *Amgen* to a patentee presenting "evidence of nonenablement that a trial court finds persuasive" as referring to evidence that is found to be persuasive after both parties have had a full and fair opportunity to present competing evidence on the issue. *See Amgen*, 314 F.3d at 1355. We do not interpret *Amgen* as limiting the patent challenger to a mere evidentiary presumption

unaccompanied by an opportunity to present extrinsic evidence in rebuttal to the patentee's case. This is all the more true in the case of non-patent, printed publication prior art where the Federal Circuit has yet to recognize expressly a presumption of enablement for non-patent, printed publication prior art references outside of the context of patent prosecution. Moreover, it is consistent with the larger body of case authority that considers enablement evidence that is extrinsic to the primary reference. *Elsner*, 381 F.3d 1125; *Donohue*, 766 F.2d 531; *Samour*, 571 F.2d 559 .

#### *E. Ultimate Burden of Persuasion*

Having determined that Edmund is entitled to present extrinsic evidence of enablement in an effort to rebut Semrock's evidence of non-enablement, we turn now to the question of whether Edmund or Semrock bears the ultimate burden of persuasion as to enablement or non-enablement of the MacLeod Treatise. Once again, the parties engage in a vigorous dispute as to which party bears the burden of persuasion.

Semrock argues that Edmund bears the ultimate burden of persuasion. Paper 68, 8. Semrock argues that, in an IPR, the Petitioner has the burden of proving a "proposition of unpatentability by a preponderance of the evidence." *Id.*, quoting 35 U.S.C. § 316(e). Semrock argues that such burden requires a Petitioner to establish that a reference teach every element of the claimed invention and is enabling. Paper 68, 8, citing *Donohue*, 766 F.2d at 533. We agree that *Donohue* stands for the proposition that an anticipating prior art reference must teach every element of the claimed invention and must be enabling. However, we do not read *Donohue* as affirmatively placing the burden on a patent challenger to establish that a reference is enabling. *Donohue* arose in the context of patent prosecution

where, as we have previously discussed, a patent examiner is given the benefit of a presumption that a prior art reference cited in an Office Action rejection is enabled, in large part, due to the lack of resources available to an examiner. *See supra*, at 21 (discussing and quoting passage of *Antor Media*, 689 F.3d at 1289).

Semrock also relies on district court case authority as supporting its position. Paper 68, 9–10, citing *Jacobs Vehicle Equip. Co. v. Pac. Diesel Brake Co.*, 829 F. Supp. 2d 11, 19 (D. Conn. 2011); *Forest Labs. Inc., v. Ivax Pharm., Inc.*, 438 F. Supp. 2d 479, 487 n.3 (D. Del. 2006). Semrock argues that “while a patentee may have the burden of going forward with rebuttal evidence once the challenger has shown a prima facie case of invalidity, the ultimate burden of invalidity remains with the challenger throughout the litigation.” Paper 68, 9, quoting *Abbott Labs v. Diamedix Corp.*, 969 F. Supp. 1064, 1067 (N.D. Ill. 1997).

Edmund contends that Semrock, as the party challenging enablement of the MacLeod Treatise, bears the ultimate burden of persuasion. Paper 69, 8. Edmund argues that the following language from *Amgen* places the burden of persuasion on the patentee.

[I]t was Amgen [the patentee] who bore the burden of proving the nonenablement of Sugimoto before the district court. TKT [the patent challenger] did not bear a burden of proving enablement.

Paper 69, 9 (quoting *Amgen*, 314 F.3d at 1355).

Edmund articulates the correct position on this issue. In the case of *Impax Labs, Inc. v. Aventis Pharma, Inc.*, 545 F.3d 1312 (Fed. Cir. 2008), the Federal Circuit explained that, in *Amgen*, it assigned error to a district court that placed an affirmative burden of proving enablement of a prior art

reference on the patent challenger. *Id.* at 1316. The Federal Circuit further noted in *Impax* that the district court correctly placed the burden of proving non-enablement on the patentee. *See id.*

In this case, we will follow the Federal Circuit's decisions in *Amgen* and *Impax*. After receiving competing evidence of enablement and non-enablement from the respective parties, we place the ultimate burden of persuasion on Semrock as the patentee.

#### *F. Analysis of the Enablement Evidence*

Analysis of enablement of an anticipation reference contemplates consideration of whether undue experimentation would be required to practice an invention. *See, e.g., Elan Pharms*, 346 F.3d at 1054 (the reference must teach how to carry out the invention without undue experimentation). The factors relevant to whether experimentation is undue are discussed in, *e.g., In re Wands*, 858 F.2d 731; *Cephalon, Inc. v. Watson Pharma, Inc.*, 707 F.3d 1330, 1336 (Fed. Cir. 2013). These factors include:

- (1) the quantity of experimentation necessary,
- (2) the amount of direction or guidance presented,
- (3) the presence or absence of working examples,
- (4) the nature of the invention,
- (5) the state of the prior art,
- (6) the relative skill of those in the art,
- (7) the predictability or unpredictability of the art, and
- (8) the breadth of the claims.

*Cephalon*, 707 F.3d at 1336.

In the instant case, Semrock points out that Figure 7.26 of the MacLeod Treatise merely shows a textbook, theoretical example that fails to

take into account optical transmission losses that would occur in the making of an actual filter. PO Resp. 2–17. Such losses include transmission losses in ZnS layers resulting from absorption (*Id.* at 8), scattering (*Id.* at 9), and manufacturing tolerances (*Id.* at 12).

Edmund does not deny the reality of absorption losses or that the MacLeod Treatise fails to take absorption losses into account. Instead, Edmund dismisses Semrock’s evidence on the amount of absorption loss as exaggerated and maintains that the Figure 7.26 example of the MacLeod Treatise would still exhibit more than 90 percent transmission under real, as opposed to theoretical, conditions. Reply 2–4 (characterizing transmission losses as “negligible”). Edmund presents calculated estimates of transmission loss attributable to absorption and scattering prepared by Professor MacLeod for purposes of this litigation and using, as an entering argument, a value for the extinction coefficient of ZnS (“*k*”) derived from Professor MacLeod’s review of scientific literature. Reply 7 (citing Ex. 1029 ¶¶ 25–35). Finally, Edmund attacks Semrock’s position on the amount of expected transmittance loss attributable to manufacturing tolerances with additional theoretical calculations prepared by Professor MacLeod for purposes of this litigation. Reply 11 (citing Ex. 1029 ¶¶ 41–44). Edmund dismisses Semrock’s evidence on manufacturing losses as “grossly over exaggerated.” *Id.*

In response to Semrock’s case on non-enablement of the MacLeod Treatise, Edmund does not address the *Wands* factors. As to the first *Wands* factor “quantity of experimentation necessary,” Edmund’s case assumes that a person of ordinary skill in the art would experience no difficulty in making

a ZnS/Cryolite laser-line filter using conventional, prior art fabrication techniques without undertaking any experimentation.

With respect to the second *Wands* factor, “amount of guidance provided in the reference,” Edmund does not direct us to any passage in the MacLeod Treatise that purports to teach one how to actually make a filter that exhibits the performance of Figure 7.26. Furthermore, although Edmund relies on a plethora of secondary references for establishing a value of the extinction co-efficient  $k$  of ZnS, Edmund does not direct our attention to any teaching disclosure in its secondary references that would instruct a person of ordinary skill in the art to make an actual ZnS/Cryolite laser-line filter that exhibits 90 percent transmission. With respect to the seventh *Wands* factor concerning the predictability or unpredictability of the underlying science or technology, the evidence shows that the  $k$  value of ZnS is derived experimentally and is subject to experimental error in its determination, such that the  $k$  value of ZnS is not presently known to a reasonable degree of scientific certainty.

This brings us to consideration of the third and fifth *Wands* factors: (3) the presence or absence of working examples; and (5) the state of the prior art. The evidence shows that ZnS/Cryolite soft-coated, laser-line filters were known in the prior art. While the Figure 7.26 example in the MacLeod Treatise may be a hypothetical example, Semrock’s specification concedes that ZnS/Cryolite laser-line filters were known in the art and fabrication techniques to make them were also known. Ex. 1001, 4:28–32 (“typically manufactured by either thermal evaporation or electron-beam evaporation). However, it is one thing to know how to make a ZnS/Cryolite laser-line filter. It is another thing to make one that performs as claimed in claim 33.

Altogether missing from Edmund's case is evidence of a working example of a ZnS/Cryolite laser line filter that actually achieves the performance claimed in claim 33. Given the undisputed evidence that ZnS/Cryolite laser-line filters were known in the prior art, if Edmund's theoretical calculations are correct, evidence of actual, working examples of filters meeting the criteria of claim 33 presumably would be available. Instead, Edmund's evidentiary presentation at trial relies heavily on theoretical calculations performed by Professor MacLeod specifically for purposes of this litigation. Edmund presents no evidence of the optical performance of any actual, ZnS, laser-line filter.

#### *G. Ultimate Determination of Enablement*

A patent claim "cannot be anticipated by a prior art reference if the allegedly anticipatory [disclosure] cited as prior art [is] not enabled." *In re NTP, Inc.*, 654 F.3d 1279, 1301 (Fed. Cir. 2011). Although anticipation is a question of fact, whether a prior art reference is enabling is a question of law with underlying factual inquiries. *Id.*

The standard for what constitutes proper enablement of a prior art reference for purposes of anticipation under section 102 differs from the enablement standard for a patent application under section 112. *See Verizon Services Corp., v. Cox Fibernet Virginia, Inc.*, 602 F.3d 1325, 1337 (Fed. Cir. 2010). Anticipation does not require the actual creation or reduction to practice of the prior art subject matter; anticipation requires only an enabling disclosure. *See Schering Corp., v. Geneva Pharma, Inc.*, 339 F.3d 1373, 1380 (Fed. Cir. 2003); citing *In re Donohue*, 766 F.2d 531, 533 (Fed. Cir. 1985).



Nevertheless, we determine that the MacLeod Treatise does not enable claim 33. Claim 33 is directed to optical performance parameters. There is no dispute that multi-layer, thin-film, laser-line filters comprised of alternating layers of ZnS and Cryolite were known in the prior art. Thus, Semrock distinguishes its invention over prior art soft-coated filters on the basis of optical performance, not on the basis of using the basic structure of alternating layers of refractive materials with Fabry-Perot cavities. Upon consideration of the various *Wands* factors, including the absence of any working examples that demonstrate that Edmund's theoretical calculations are capable of realization, we conclude that Semrock has carried its burden of showing that the MacLeod Treatise does not enable claim 33.

In view of the foregoing, we find that Edmund has failed to establish, by a preponderance of the evidence, that the MacLeod Treatise anticipates claim 33.

#### IV. OBVIOUSNESS OVER MACLEOD

Edmund asserts that claims 33–36, 39–41, 44, and 45 would have been obvious over the MacLeod Treatise as a standalone reference. A patent is invalid for obviousness:

if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

35 U.S.C. § 103. Obviousness is a question of law based on underlying factual findings: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective indicia of nonobviousness. *See Graham v. John Deere Co.*

*of Kansas City*, 383 U.S. 1, 17–18 (1966). Courts must consider all four *Graham* factors prior to reaching a conclusion regarding obviousness. *See Eurand, Inc. v. Mylan Pharms., Inc. (In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.)*, 676 F.3d 1063, 1076–77 (Fed. Cir. 2012). As the party challenging the patentability of the claims at issue, Edmund bears the burden of proving obviousness by a preponderance of the evidence. *See* 35 U.S.C. § 316(e).

*A. Scope and Content of the Prior Art*

Edmund relies on the MacLeod Treatise (Ex. 1002) as a stand-alone obviousness reference. The MacLeod Treatise is discussed above in the section regarding the anticipation ground of invalidity.

*B. Differences Between the Prior Art  
and the Claimed Invention*

Edmund’s Petition does not admit to any differences between the prior art and the claimed invention. Indeed, Edmund contends that the MacLeod Treatise anticipates claim 33. Pet. 17–19.

In its Reply, Edmund, for the first time, relies on an alternative embodiment of tantalum and silica mentioned briefly in the MacLeod Treatise. Reply 12, Ex. 1002, 310. The obviousness ground of unpatentability in Edmund’s Petition does not provide a claim chart that purports to map a tantalum/silica filter embodiment from the MacLeod Treatise onto claim 33. Neither does the Petition identify the differences between the MacLeod Treatise tantalum/silica embodiment and the invention of claim 33. We have reviewed the excerpt from the MacLeod Treatise relied on in Edmund’s obviousness ground of unpatentability. Ex. 1002, 310–313. Other than mentioning the use of tantalum and silica, the MacLeod Treatise does not

provide a structure or a recitation of the expected performance parameters of such a filter.

In its Reply, Edmund concedes that meeting the performance parameters of claim 33 with a tantala/silica filter necessarily would involve more than a simple substitution of tantala and silica for the ZnS/Cryolite materials used in the Figure 7.26 example in the MacLeod Treatise.

Reply 12. Edmund contends that person of ordinary skill in the art would have attempted to redesign the filter to account for the properties of the different materials. *Id.* Although Edmund's Petition does not describe how or why a person of ordinary skill in the art would have redesigned the ZnS/Cryolite filter of Figure 7.26 to achieve the performance criteria of claim 33, Edmund argues, for the first time in its Reply, that the MacLeod Treatise provides a systematic approach to the design of multiple cavity filters, regardless of the material used. *Id.*

*C. Enablement of the MacLeod Treatise  
as an Obviousness Reference*

In conjunction with our consideration of the MacLeod Treatise under the *Graham* factors of scope and content of the prior art and differences between the prior art and the claimed invention, we also take into account issues of enablement. We previously determined that, for purposes of an anticipation analysis, the MacLeod Treatise does not enable claim 33. However, it does not follow necessarily that the MacLeod Treatise also is not enabling for purposes of an obviousness analysis. Under § 103, a reference need not be enabled, for it qualifies as prior art for whatever is disclosed therein. *See Amgen*, 314 F.3d at 1357; *see also Beckman Instruments v. LKB Produkter AB*, 892 F.2d 1547, 1551 (Fed. Cir. 1989)

(“Even if a reference discloses an inoperative device, it is prior art for all that it teaches”).

Edmund relies on, among things, *Amgen*, to support an argument that enablement is not relevant to an obviousness analysis. Paper 69, 10.

Edmund argues that, to the extent we find that the MacLeod Treatise is non-enabling for the subject matter it discloses, for obviousness purposes, such non-enablement is moot. *Id.*

Semrock takes a different view. Semrock argues that, to render a claimed method or apparatus obvious, a stand-alone reference must enable a person of ordinary skill in the art to make and use the claimed invention. Paper 68, 11, *citing Beckman*, 892 F.2d at 1551. Semrock also argues that no presumption of enablement exists in an obviousness analysis; that a Petitioner cannot introduce new extrinsic evidence in a Reply; and that Petitioner bears the ultimate burden of persuasion on the enablement of an obviousness reference. Paper 68, 12.

In the case of *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1289, 1297 (Fed. Cir. 2010), *vacated-in-part on other grounds*, 649 F.3d 1276 (Fed. Cir. 2011) (en banc), the Federal Circuit reiterated that an individual prior art reference need not be enabled as it qualifies as prior art for what is disclosed therein. *Id.* (citing *Amgen*, 314 F.3d at 1357). The *Therasense* Court also reiterated that, in order to render a claimed apparatus or method obvious, the cited prior art as a whole must enable one skilled in the art to make or use the apparatus or method. *See id.* (citing *Beckman Instruments*, 892 F.2d at 1551). “References relied upon to support a rejection under [35 U.S.C. § 103] must provide an enabling disclosure, *i.e.*, they must place the claimed invention in the possession of the public.” *In re*

*Payne*, 606 F.2d 303, 314 (CCPA 1979). An invention is not “possessed” absent some known or obvious way to make it. *In re Hoeksema*, 399 F.2d 269, 274 (CPA 1968).

Thus, notwithstanding our determination that the MacLeod Treatise does not enable claim 33 for purposes of an anticipation analysis, we will consider it as prior art for all that it does teach. We will also require Edmund, as the party challenging the patentability of claim 33, to prove, by a preponderance of the evidence, that the prior art, as a whole, enables one skilled in the art to practice the invention of claim 33. In this regard, we will consider the background knowledge possessed by a person of ordinary skill in the art, including background knowledge that may be evidenced through secondary references. *See Randall Mfg. v. Rea*, 733 F.3d 1355, 1362–63 (Fed. Cir. 2013). We will also consider other evidence that tends to establish the level of ordinary skill in the art, including expert testimony.

#### *D. Level of Ordinary Skill in the Art*

Edmund’s Petition does not articulate a position as to the level of ordinary skill other than to conclude that such a person would have found it obvious to achieve the invention claimed in the ’960 patent. Pet. 1. Edmund’s experts, Mr. Schallenberg and Professor MacLeod, testify that a person of ordinary skill in the art would have had sufficient knowledge of basic physics and interference optics to appreciate and understand the principles of optical coatings. Ex. 1012 ¶¶ 11–12; Ex. 1011 ¶¶ 13–14. They each opine, using almost identical language, that a person of ordinary skill in the art would have had a bachelor’s degree in physics, optical engineering, or electrical engineering and would have an unstated amount of “experience” in thin-film optics. *Id.*

Semrock's Patent Owner Response does not articulate a position as to the level of ordinary skill. Semrock's expert, Dr. Rancourt, testifies that a person of ordinary skill in the art at the time of the invention would have had a bachelor's degree in physics, optical engineering, electrical engineering, or equivalent, and three to five years of experience designing and manufacturing thin film optical filters. Ex. 2004 ¶ 25. According to Dr. Rancourt, a person of ordinary skill in the art would have been familiar with techniques for monitoring the layer thickness for optical multilayer coatings.

Neither party presents a detailed evidentiary showing under the factors recited in *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983).<sup>16</sup> Notwithstanding the scant evidence on skill level presented by the parties, the level of skill in the art often can be determined from a review of the prior art. *See Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163–64 (Fed. Cir. 1985). Based on our review of the prior art, the applicable field of endeavor is optical filter technology. The person of ordinary skill in this field would have been generally familiar with hard and soft coating materials used in optical filters. Ex. 1001, 4:28–32; Ex. 1002, 310. The person of ordinary skill in the art

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<sup>16</sup> Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *See id.* These factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *See Daiichi Sankyo Co., Ltd. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

would have been familiar with techniques for depositing filter materials, such as thermal evaporation, electron-beam evaporation, and ion-beam sputtering. *Id.* at 4:28–34. The ordinary artisan also would have been familiar with techniques for monitoring the thickness of a deposition layer. Ex. 1002, 275; Ex. 1001, 5:18–6:3. Such an artisan also would have been familiar with the basic principles underlying the structure of an optical filter, including designs incorporating alternating layers of materials of high and low refractive indices, the creation of Fabry-Perot cavities, and the effects of varying the thickness of the respective layers. Ex. 1001, 4:12–27; Ex. 1002, 257.

*E. Secondary Considerations of Non-Obviousness*

Evidence of secondary considerations of non-obviousness, when present, must always be considered en route to a determination of obviousness. *See Cyclobenzaprine*, 676 F.3d at 1075–76. However, the absence of secondary considerations is a neutral factor. *See Custom Accessories, Inc., Jeffrey-Allan Industries, Inc.*, 807 F.2d 955, 960 (Fed. Cir. 1986). Neither party introduced evidence on secondary considerations of non-obviousness. Consequently, we will focus our attention on the first three *Graham* factors.

*F. Whether the Prior Art Could Have Been Modified to Achieve the Claimed Invention*

The Supreme Court instructs courts to take an expansive and flexible approach in determining whether a patented invention was obvious at the time it was made. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 415 (2007). The existence of a reason for a person of ordinary skill in the art to

modify a prior art reference is a question of fact. *See In re Constr. Equip. Co.*, 665 F.3d 1254, 1255 (Fed. Cir. 2011). A reason to modify a prior art reference may be found explicitly or implicitly in market forces; design incentives; the “interrelated teachings of multiple patents”; “any need or problem known in the field of endeavor at the time of invention and addressed by the patent”; and the background knowledge, creativity, and common sense of the person of ordinary skill. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328–29 (Fed. Cir. 2009) (quoting *KSR*, 550 U.S. at 418–21)).

In the instant case, Edmund’s Petition fails to present persuasive evidence, argument, or technical reasoning as to why or how a person of ordinary skill in the art would have modified the Figure 7.26 hypothetical filter example of the MacLeod Treatise to achieve a filter with the performance criteria recited in claim 33. Indeed, Edmund’s Petition does not acknowledge that there are any differences between the prior art and the claimed invention that require modification.

With respect to tantala and silica filters mentioned in the MacLeod Treatise (Ex. 1002, 310) and Edmund’s Reply, Dr. Rancourt testifies that such hard coated materials have a different index ratio than the ZnS and Cryolite filter of Figure 7.26 in the MacLeod Treatise. Ex. 2004 ¶ 42. Consequently, according to Dr. Rancourt, there will be less blocking for a given number of layers for a stack made from materials with a lower index ratio. *Id.* Dr. Rancourt further testifies that changing the materials of the filter layers also will alter the spectral width of the pass band. *Id.* ¶¶ 42–44. Thus, Dr. Rancourt concludes that a person of ordinary skill in the art would be faced with a significant amount of redesign to get the performance of a



hard material design to match the performance of the soft materials used in Figure 7.26. *Id.*

In its Reply, Edmund argues that a person of ordinary skill in the art would not have made a simple substitution of tantala and silica for the ZnS and Cryolite for the design of Figure 7.26. Reply 12. Edmund argues that a person of ordinary skill in the art also would have attempted to optimize the design taking into account the properties of the new materials using unspecified “methods of MacLeod Ex. 1002.” *Id.* Edmund argues that the MacLeod Treatise provides a systematic approach to the design of multiple cavity filters, regardless of the material. *Id.* Edmund argues that a person of ordinary skill in the art would have used the Essential MacLeod software, TFCalc, or another commercially available filter design software from 2003 to redesign the Figure 7.26 filter using hard-coating materials to achieve filter designs that satisfy claim 33. *Id.* at 13. Edmund relies on testimony from Professor MacLeod in support of these contentions. *Id. citing* Ex. 1029 ¶¶ 45–48. Edmund also argues that a person of ordinary skill in the art would have known the proper manufacturing techniques to make such a filter, citing declaration testimony from Professor MacLeod. Reply 13; Ex. 1029 ¶ 49.

Although Edmund’s Petition is essentially silent on tantala/silica filters mentioned briefly in the MacLeod Treatise, Professor MacLeod submits declaration testimony in support of Edmund’s Petitioner’s Reply regarding the ease of substituting tantala and silicon for the ZnS and Cryolite of Figure 7.26 design. Ex. 1029 ¶¶ 49–56. Professor MacLeod offers the results of a computer filter design that he prepared specifically for use in this proceeding and, more particularly, for purposes of his declaration testimony

in support of Edmund's Reply. *Id.* Professor MacLeod opines that the results of his computer design example meet the requirements of claim 33. *Id.* ¶ 56.

Professor MacLeod's Reply declaration testimony is unpersuasive for numerous reasons, which we discuss in detail below. First, such evidence should have been submitted contemporaneous with the Petition rather than waiting until the Reply. Second, the quantitative data reported by Professor MacLeod relates to a hypothetical design, as opposed to empirical data obtained from an actual filter. Ex. 1029 ¶¶ 49–56. Third, the parameters used in Professor MacLeod's study admit of *post hoc* hindsight reasoning. Ex. 1029 ¶ 52. Fourth, Professor MacLeod's testimony regarding the ability of a person of ordinary skill in the art to manufacture an actual hard-coating filter that satisfies the performance limitations of claim 33 is unsubstantiated and conclusory.

Professor MacLeod's Exhibit 1029 declaration was not submitted contemporaneously with the Petition and, instead was submitted in connection with Edmund's Reply. A Reply to a Patent Owner's Response is authorized by our Rules. *See* 37 C.F.R. § 42.23(b). However, “[a] reply may only respond to arguments raised in the corresponding opposition.” *Office Patent Trial Practice Guide*, 77 Fed. Reg. at 48,767. Under the rules governing IPR proceedings, a Petition must provide a full statement of the relief requested, including a detailed explanation of the significance of the evidence, including material facts. *See* 37 C.F.R. § 42.22(a)(2). It is axiomatic that a Petition cannot provide a detailed explanation of the significance of evidence when that evidence is not presented until the Petitioner files its Reply. Among other things, one indication that a new

issue has been raised in a Reply is “new evidence that could have been presented in a prior filing.” *Office Patent Trial Practice Guide*, 77 Fed. Reg. at 48,767.

By waiting and filing its expert declaration after Semrock filed its Patent Owner Response, Edmund effectively precluded Semrock from addressing Professor MacLeod’s Exhibit 1029 declaration in its Response. This also effectively precluded Semrock’s expert, Dr. Rancourt, from responding to Professor MacLeod’s belated testimony in his declaration that was filed in support of Semrock’s Response. We will not countenance such tactics. *See Murphy v. Village of Hoffman Estates*, 1999 U.S. Dist. LEXIS 3320, at \*5–6 (N.D. Ill. 1999) (“[I]t is established beyond peradventure that it is improper to sandbag one’s opponent by raising new matter in reply.”). A Reply that belatedly presents evidence will not be considered. *Office Patent Trial Practice Guide*, 77 Fed. Reg. at 48,767. Edmund’s original Petition asserted a ground of unpatentability over the ZnS/Cryolite of Figure 7.26 of the MacLeod Treatise. If Edmund wanted to present a ground of unpatentability over the ZnS/Cryolite embodiment of Figure 7.26 in combination with a tantala/silica embodiment, Edmund should have presented evidence as to how and why a person of ordinary skill in the art would have combined the two embodiments to achieve the invention of claim 33 contemporaneous with the filing of its original Petition. *See KSR*, 550 U.S. at 418 (requiring articulated reasoning with rationale underpinning as to how or why a person of ordinary skill in the art would have combined or modified the teachings of the prior art). Presenting such evidence and argument for the first time in a Reply is untimely.

Professor MacLeod's belated testimony relates to a hypothetical design, not an actual filter. Ex. 1029 ¶¶ 49–56. As we discussed previously, Semrock presented persuasive evidence through Dr. Rancourt that an actual filter will exhibit transmission losses due to various factors. Ex. 2004 ¶¶ 55, 57, 71, 90 (absorption); ¶¶ 55, 56, 87–90 (scattering); ¶¶ 94–111 (manufacturing tolerances).

During the Oral Hearing, Semrock's counsel argued, persuasively, that Professor MacLeod's tantalum/silicon theoretical design example employs hindsight reasoning. Tr. 51. As we understand Professor MacLeod's testimony, in order to generate his proposed design, Professor MacLeod essentially input the performance parameters claimed in claim 33 into computer design software and then had the software work backward to generate the design.

Precedent recognizes the pitfalls of judicial hindsight exercised at the time of litigation, the Court cautioning in *KSR* that “[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” 550 U.S. at 421. *See also, e.g., Diamond Rubber [Co. of N.Y. v. Consol. Rubber Tire Co.]*, 220 U.S. [428,] [434–35 [(1911)] (“Many things, and the patent law abounds in illustrations, seem obvious after they have been done, and, in the light of the accomplished result, it is often a matter of wonder how they so long eluded the search of the discoverer and set at defiance the speculations of inventive genius.” (quotation omitted)); *Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 956 (Fed. Cir. 1997) (“Good ideas may well appear ‘obvious’ after they have been disclosed, despite having been previously unrecognized.”).

*Outside the Box Innovations, LLC v. Travel Caddy Inc.*, 695 F.3d 1285, 1298 (Fed. Cir. 2012). Professor MacLeod's attempt to “design” a hard-coated filter by using the performance criteria recited in claim 33 as entering

parameters to his design software is a classic example of hindsight reasoning.

Finally, Edmund argues that “A [person of ordinary skill in the art] would have known the proper manufacturing techniques.” Reply 13. Edmund cites a single paragraph from Professor MacLeod’s testimony in support of this conclusory statement. *Id.*; Ex. 1029 ¶ 49. Professor MacLeod’s testimony from this paragraph, in its entirety, is reproduced below:

One of ordinary skill in the art would know that evaporation techniques are appropriate for the deposition of soft coating materials such as ZnS using turning point monitoring, and that other techniques, such as ion beam sputtering with known optical monitoring, would be appropriate for the deposition of hard coating materials such as Ta<sub>2</sub>O<sub>5</sub>. A person of ordinary skill in the art would expect negligible, if any, transmission loss using tantalum and silica for the filter.

Ex. 1029 ¶ 49. Under our rules, expert testimony that does not disclose the underlying facts or data on which an opinion is based is entitled to little or no weight. *See* 37 C.F.R. § 42.65(a); *Office Patent Trial Practice Guide*, 77 Fed. Reg. at 48,763; *Rohm & Haas Co. v. Brotech Corp.*, 127 F.3d 1089, 1092 (Fed. Cir. 1997) (nothing in the Federal Rules of Evidence or Federal Circuit jurisprudence requires the fact finder to credit unsupported assertions of an expert witness). We are not inclined to credit such unsubstantiated testimony.

In an obviousness analysis, some kind of reason must be shown as to why a person of ordinary skill would have thought of modifying a reference to achieve the patented invention. *See Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1374 (Fed. Cir. 2008). Furthermore, an obviousness determination requires not only a reason to modify a prior art reference, but

also that a skilled artisan in doing so would have perceived a reasonable expectation of success in making the invention. *See Medichem, S.A., v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006). On the record before us, we determine that Edmund fails to persuasively establish that a person of ordinary skill in the art would have been able to modify the Figure 7.26 example of the MacLeod Treatise to achieve the invention of claim 33.

*G. Ultimate Conclusion of Obviousness  
as to Claim 33*

After considering all of the underlying factual considerations, the ultimate conclusion of obviousness is a question of law. *See Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1359 (Fed. Cir. 2007). “[T]he great challenge of the obviousness judgment is proceeding without any hint of hindsight.” *Star Scientific, Inc., v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1375 (Fed. Cir. 2011). After considering Edmund’s obviousness presentation under the *Graham* factors and Edmund’s lack of evidence on how or why a person of ordinary skill in the art would have modified the hypothetical ZnS/Cryolite soft-coated filter design of Figure 7.26 to achieve the patented invention, we conclude that Edmund has failed to establish, by a preponderance of the evidence, that claim 33 is obvious.

*H. Ultimate Conclusion of Obviousness as to  
Claims 34–36, 39–41, 44, and 45*

Claims 34–36, 39–41, 44, and 45 depend, directly or indirectly, from claim 33. Ex. 1001. In view of our determination that Edmund has failed to establish that independent claim 33 would have been obvious, it necessarily follows that Edmund has failed to establish that dependent claims 34–36, 39–41, 44, and 45 are unpatentable as obvious. *See In re Fritch*, 972 F.2d

1260, 1266 (Fed. Cir. 1992) (dependent claims are nonobvious if the independent claims from which they depend are nonobvious).

## V. MOTIONS TO EXCLUDE EVIDENCE

### *A. Edmund's Motions to Exclude*

Edmund moves the Board to exclude the following testimony:

1. Dr. Rancourt declaration (Exhibit 2004): ¶¶ 42–44, 57–64, 82–84, 90–93, 100–108, and 114–118;
2. Dr. Rancourt declaration (Exhibit 2005): ¶ 49;
3. Dr. Rancourt declaration (Exhibit 2030): ¶¶ 29 and 37–38;
4. Dr. Rancourt declaration (Exhibit 2031): ¶¶ 20, 22, and 25–55; and
5. Ms. Kruschwitz declaration (Exhibit 2014): ¶¶ 11, 12, 14–21.

Paper 51. Semrock opposes Edmund's motion. Paper 59. Edmund replies to Semrock's opposition. Paper 63.

### *B. Semrock's Motions to Exclude*

Semrock moves the Board to exclude paragraphs 15–21 and 24–35 of Exhibit 1029, the declaration of Edmund's expert, Professor MacLeod, submitted in support of Edmund's Reply. Paper 52. Edmund opposes the motion. Paper 58. Semrock replied to Edmund's opposition. Paper 64.

### *C. Analysis of Edmund's and Semrock's Motions*

Although Edmund and Semrock each advance separate arguments for the exclusion of separate paragraphs or groups of paragraphs of expert declaration testimony submitted by their opponents, we find it expedient to dispose of both motions to exclude in a single discussion. Edmund and Semrock each urge us to exclude their opponent's expert testimony in the

exercise of our “gatekeeping” function under the auspices of Federal Rule of Evidence 702 and *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 589 (1993). Paper 51, 1, 2, 4–15; Paper 52, 2–3. The Federal Rules of Evidence permit receipt of expert testimony at trial under certain prescribed circumstances, providing that

[i]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

Fed. R. Evid. 702; accord *Daubert, supra*; *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

When faced with expert scientific testimony, a court must first determine “whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact at issue.” *Daubert*, 509 U.S. at 592. This requires an assessment of the reasoning and methodology underlying the testimony to determine whether it is scientifically valid. *See id.* *Daubert* outlines four factors for courts to consider when evaluating the validity and relevance of scientific evidence pursuant to Rule 702 of the Federal Rules of Evidence. *See id.* at 592–93. These factors include (1) whether the methodology can and has been tested, (2) whether the methodology is subject to peer review, (3) the potential rate of error, and (4) the general acceptance of the methodology. *See id.* at 593–94.



Under *Daubert* and Rule 702 of the Federal Rules of Evidence, courts are charged with a “gatekeeping role,” the objective of which is to ensure that expert testimony admitted into evidence is both reliable and relevant. *Daubert*, 509 U.S. at 597. “The focus, of course, must be solely on principles and methodology, not on the conclusions that they generate.” *Id.* at 595. We note that the concerns relative to the “gatekeeping role” are less important in a bench trial, such as an IPR proceeding, where no screening of the factfinder can take place. *See Seaboard Lumber Co. v. United States*, 308 F.3d 1283, 1301–02 (Fed. Cir. 2002). The *Daubert* standards of relevance and reliability must nevertheless be met. *See id.*

A trial judge is given considerable leeway in deciding how to determine whether the expert’s testimony is sufficiently reliable for admission. *See Kumho Tire* 526 U.S. at 152. Thus, the *Daubert* inquiry is “a flexible one,” depending on the nature of the issue, the witness’s expertise, and the subject of the testimony. *Id.* at 150. “[R]ejection of expert testimony is the exception, rather than the rule, and [the court] will generally permit testimony based on allegedly erroneous facts when there is some support for those facts in the record.” *In re Scrap Metal Antitrust Litig.*, 527 F.3d 517, 530 (6th Cir. 2008) (internal quotations and citations omitted).

In the instant case, Edmund relies on the MacLeod Treatise (Ex. 1002) as the sole reference for its challenges to the ’960 patent on the grounds of anticipation and obviousness. The MacLeod Treatise is a textbook that Semrock essentially characterizes as theoretical in nature. Semrock challenges the MacLeod Treatise, as an anticipation and obviousness reference, among other things, on the grounds that it is non-

enabled. PO Resp. 1. Semrock contends that, in the real world as opposed to the theoretical world of the MacLeod Treatise, a filter using layers of ZnS could not achieve the 90% transmission limitation of claim 33 of the '960 patent. PO Resp. 20. Semrock's contention relies on Dr. Rancourt's testimony. *Id.* at 20–21; Ex. 2004 ¶ 111. Dr. Rancourt, in turn, relies on published literature to support his opinion that scattering losses and absorption would preclude a ZnS filter from achieving transmittance of 90%. Among other things, Dr. Rancourt relies on Al-Douri (Ex. 2009), Ahrens (Ex. 2008), Pulker I (Ex. 2011), Pulker II (Ex. 2012), Gibson and Wilson (Ex. 2010), Kersten (Ex. 2013), Siqueiros (Ex. 2006), and MacLeod and Richmond (Ex. 2007) as authoritative, published literature in the field that supports his opinions and conclusions. *See* Ex. 2004, 8–10; Ex. 2005, 7–9.

Similarly in its Reply, Edmund relies on testimony from its expert, Professor MacLeod. In connection with his opinion that the MacLeod Treatise (Ex. 1002) is enabling, Professor MacLeod opines that the extinction coefficient  $k$  for ZnS, a component in the calculation to estimate light absorption of ZnS layers in an optical filter, is extremely small, generally on the order of  $10^{-6}$ . Ex. 1029 ¶ 15, 18, 19. Professor MacLeod relies on Ahrens II (Ex. 1024) and Czyzak (Ex. 1030) as authoritative literature in the field to support his opinion. Ex. 1029 ¶¶ 18, 19.

We have reviewed the challenged portions of the parties' respective expert witness declarations. We also have reviewed the respective motions, and oppositions, and replies of the parties. Neither party presents an analysis under the factors enumerated in *Daubert*. *See Daubert*, 509 U.S. at 593–94. Each of the parties' primary experts, Professor MacLeod and Dr. Rancourt, appear to be well qualified in the field of optical filter

technology. However, Dr. Rancourt and Professor MacLeod rely on different, and seemingly inconsistent, if not contradictory, articles of published literature to bolster their respective opinions concerning the absorption, reflectance, and transmittance of light by ZnS layers in optical filters. For example, Professor MacLeod relies on Ahrens II as disclosing a  $k$  value of  $9 \times 10^{-6}$ . Ex. 1029 ¶ 18. Dr. Rancourt dismisses this  $k$  value as a typographical error. Ex. 2031 ¶¶ 35, 38, 43–55. In turn, Dr. Rancourt relies on Pulker I, Pulker II, Gibson, Kersten, Ahrens, and Siqueiros as establishing a much higher  $k$  value. Ex. 2004 ¶¶ 57–64, 90–92. Professor MacLeod criticizes Dr. Rancourt’s sources as reporting extinction coefficients for ZnS that are “high and unsupported.” Ex. 1029 ¶ 16.

The parties’ dispute over the value of  $k$  is not a *Daubert* issue. It is not the court’s role under *Daubert* to evaluate the correctness of facts underlying an expert’s testimony. *See i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 856 (Fed. Cir. 2010). Although Professor MacLeod vouches for the results in certain publications and Dr. Rancourt vouches for the results in a divergent set of publications, there is no evidence that either Professor MacLeod or Dr. Rancourt personally participated in the scientific experiments and data gathering reported in their respective sources.

In an IPR proceeding, the credibility of an expert witness’ testimony may be tested by cross-examination. *See* 37 C.F.R. § 42.53. Vigorous cross examination, presentation of contrary evidence, and careful adherence to the burden of proof are the traditional means of dealing with shaky but admissible evidence, including shaky expert testimony. *See Daubert*, 509 U.S. at 595–96. It is well settled that determinations on admissibility should not supplant the adversarial process. *See Gayton v. McCoy*, 593 F.3d 610,

616 (7th Cir. 2010) (*citing Daubert*, 509 U.S. at 596). In the instant case, each party has availed itself of the opportunity to cross-examine its opponent's expert. Exs. 1027, 1028, 1045, 1046, 2028.

With the foregoing in mind, we determine that the issues raised in the parties' respective motions to exclude more properly go to the weight, rather than the admissibility, of the evidence. Accordingly, we DENY, in its entirety, Edmund's Motion to Exclude. For essentially the same reasons, we DENY, in its entirety, Semrock's Motion to Exclude.

#### VI. SEMROCK'S CONTINGENT MOTION TO AMEND

Inasmuch as we find that Edmund has failed to establish that any of the challenged claims are unpatentable, we do not reach Semrock's Contingent Motion to Amend or Edmund's Objection to Semrock's Reply to Contingent Motion to Amend.

#### VII. ORDER

In view of the foregoing, it is ORDERED as follows:

1. Claim 33 of U.S. Patent No. 7,119,960 C1 has not been shown to be unpatentable as anticipated by the MacLeod Treatise; and
2. Claims 33–36, 39–41, 44, and 45 of U.S. Patent No. 7,119,960 C1 have not been shown to be unpatentable as obvious over the MacLeod Treatise.

This is a final 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.

Case IPR2014-00599  
Patent 7,119,960

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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EDMUND OPTICS, INC.,  
Petitioner,

v.

SEMROCK, INC.,  
Patent Owner.

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Case IPR2014-00599  
Patent 7,119,960 C1

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WARD, *Administrative Patent Judge*, concurring-in-part and dissenting-in-part.

I concur with my fellow judges on this case except with respect to (1) the majority's failure to provide a presumption of enablement for a prior art printed publication in an *inter partes* review proceeding, and (2) the majority's conclusion that the ultimate burden of persuasion with respect to the enablement of a prior art printed publication in such a proceeding should be placed upon the patent owner. Majority Opinion ("Maj. Op."), 20–22 and 27–29.

First, in *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F. 3d 1313, 1355 (Fed. Cir. 2003), the Federal Circuit held "that an accused infringer should be [] entitled to have the district court presume the enablement of unclaimed (and claimed) material in a prior art patent defendant asserts

against a plaintiff.” The Federal Circuit extended that logic in *In re Antor Media Corp.*, 689 F.3d 1282 (Fed. Circ. 2012) to presume the enablement of a prior art printed publication. *Id.* at 1288 (“there is no reason why printed publications . . . should not logically receive the same presumption and for the same reasons”). I see no basis for ignoring the Federal Circuit’s instructions in an *inter partes* review proceeding; thus, the petitioner in an *inter partes* review proceeding should receive a presumption of enablement with respect to a prior art printed publication. A presumption which the patent owner may rebut with evidence and/or argument that the prior art printed publication is not enabled. *See e.g., Antor*, 689 F.3d 1289 (“the burden shifts to the applicant to submit rebuttal evidence of nonenablement.”)

Second, the majority incorrectly places the ultimate burden of persuasion with respect to the nonenablement on the patent owner in an *inter partes* review proceeding. Maj. Op., 29. In placing the ultimate burden of persuasion on the patent owner, the majority fails to provide a proper burden shifting framework involving a burden of production and a burden of persuasion.

“[T]here are two distinct burdens of proof: a burden of persuasion and a burden of production.” *Dynamic Drinkware, LLC v. National Graphics, Inc.*, – F.3d –, 2015 WL 5166366, \*2 (Fed.Cir. Sept. 4, 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327 (Fed. Cir. 2008)). Furthermore, “[i]n an *inter partes* review, the burden of persuasion is on the petitioner to prove ‘unpatentability by a preponderance of the evidence,’ 35 U.S.C. § 316(e), and *that burden never shifts to the patentee.*” *Id.* at \*2 (emphasis added). The burden of production, however,

may shift between the parties and involves ““producing additional evidence and presenting persuasive argument based on new evidence or evidence already of record.”” *Id.* at \*3 (quoting *Tech. Licensing*, 545 F.3d at 1327).

In *Dynamic Drinkware*, the Federal Circuit affirmed the Board’s use of the burden shifting framework in the analysis of a prior art reference relied upon in an anticipation challenge. *Id.* at \*3. Specifically, the Federal Circuit determined that the burden of production correctly shifted to the Patent Owner to argue or produce evidence that the challenged claims were reduced to practice prior to the filing date of the allegedly anticipating prior art. *Id.* at \*4. However, the ultimate burden of persuasion to prove unpatentability based on the allegedly anticipating prior art “never shifted” and remained with the Petitioner. *Id.*

Here, the majority’s decision fails to follow the burden shifting framework set forth in *Dynamic Drinkware* and assigns the ultimate burden of persuasion for proving nonenablement on the patent owner. In reaching its conclusion, the majority cites to *Impax Labs, Inc. v. Aventis Pharma, Inc.*, 545 F.3d 1312, 1316 (Fed. Cir. 2008), as noting that the district court placed the burden of proving nonenablement on the patentee. Maj. Op. 28. The cited language from *Impax*, however, identifies that a *burden of production* is to be placed on the patentee, not the ultimate burden of persuasion. *See Impax*, 545 F.3d 1316. As the Federal Circuit noted in *Impax*, the “infringer enjoys a presumption that the anticipating disclosure enables the claimed invention.” *Id.* The infringer is provided with this presumption because it bears the ultimate burden of persuasion. If the ultimate burden of persuasion was on the patentee, as the majority concludes, the infringer would not

require a presumption because the failure or success of the enablement proof would rest with patentee.

As the Federal Circuit identified in *Impax*, a proper enablement analysis involves a “burden-shifting framework.” *Id.* For example, in the prosecution context evaluated in *In re Morsa*, 713 F.3d 104, 110 (Fed. Cir. 2013), the Federal Circuit enumerated this burden-shifting framework in a proper prior art enablement analysis. The Federal Circuit stated that “the burden [is] on the applicant in the first instance to challenge the prior art” and “[o]nce an applicant makes a non-frivolous argument that the cited prior art is not enabling,” the PTO must address that challenge and come forward with evidence of enablement. *Id.* (vacating the Board’s finding of anticipation for failure to engage in the proper enablement analysis).

A similar burden-shifting framework for a proper prior art enablement analysis is appropriate in *inter partes* review. Like the antedating analysis in the *inter partes* review in *Dynamic Drinkware*, a proper enablement analysis in an *inter partes* review shifts the burden back and forth between the petitioner and patent owner. Specifically, in a proper prior art printed publication enablement analysis, the petitioner receives the benefit of the presumption that an asserted prior art printed publication is enabling, shifting the burden to the patent owner to meet a burden of production. This burden of production requires patent owner to present evidence and/or arguments, which establish concrete reasons why the prior art printed publication is not enabled. *See c.f., Dynamic Drinkware*, 2015 WL 5166366, \*4 (“[t]he burden of production then shifted to National Graphics [Patent Owner] to argue or produce evidence . . . that Raymond is not prior art”). If the patent owner is able to meet its burden of production, the burden



shifts back to the petitioner, the party bearing the ultimate burden of persuasion, to overcome patent owner's evidence and argument and establish "beyond a preponderance of the evidence" that the prior art printed publication is enabled. 35 U.S.C. § 316(e); *see c.f.*, *Dynamic Drinkware*, 2015 WL 5166366, \*4 ("the burden of production returned to [Petitioner] Dynamic to prove . . . the benefit of filing date prior to the date of National Graphics' reduction to practice.")

Here, Patent Owner Semrock presented arguments and supporting evidence that the MacLeod Treatise does not enable the invention of claim 33. PO Resp. 19–22 (citing Ex. 2004 ¶¶ 58–83, 111). Petitioner Edmund then presented arguments and evidence in an attempt to overcome the nonenablement issues raised by Patent Owner Semrock. Reply 1–8 (citing Ex. 1029, ¶¶ 15–27). The majority reviewed this evidence under the factors set forth in *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988) and determined that the MacLeod Treatise does not enable claim 33. Maj. Op. 33. I agree, but not because Patent Owner Semrock met its burden, rather that Petitioner Edmund failed to satisfy the ultimate burden of persuasion, requiring proof "beyond a preponderance of the evidence" that the prior art printed publication of MacLeod is enabled. 35 U.S.C. § 316(e).

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Patent 7,119,960

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