



McKELVIE, District Judge

This is a patent case. Plaintiff EMI Group North America, Inc. (“EMI”) is a Delaware corporation with its principal place of business in Wilmington, Delaware. EMI is the owner of U.S. Patent Nos. 4,826,785 (the ’785 patent) and 4,935,801 (the ’801 patent). Defendant Cypress Semiconductor Corporation is a Delaware corporation with its principal place of business in San Jose, California.

On June 18, 1998, EMI filed a complaint, which it subsequently amended on July 15, 1998, alleging that Cypress infringes one or more claims of the ’785 patent and the ’801 patent. EMI seeks injunctive relief, and an award of actual damages, increased damages, costs, and fees.

On July 29, 1998, Cypress filed its answer denying infringement and asserting affirmative defenses of invalidity and unenforceability of EMI’s patents. Cypress seeks a declaratory judgment that the patents in suit are invalid, and an award of costs and fees.

On September 14, 1999, the court held a trial in accordance with Markman v. Westview Instruments, Inc., 517 U.S. 370 (1996), to construe disputed claims of the ’785 and ’801 patents. On September 30, 1999, the court issued an opinion construing the disputed claims.

On October 18, 1999, the parties began a two-week jury trial. On October 29, 1999, the jury rendered its verdict that the asserted claims are not infringed by Cypress’s accused products, that the claims are invalid for anticipation and

obviousness, and that the claims are invalid for lack of utility and lack of enablement because they describe a physically impossible device.

On November 4, 1999, the court entered judgment pursuant to Fed. R. Civ. P. 58 in favor of the defendant and against the plaintiff on the plaintiff's claims.

On November 18, 1999, EMI moved for judgment as a matter of law and for a new trial. The issues raised by EMI include whether substantial evidence supports the jury's verdict that the asserted claims disclose a physically impossible device; whether the jury's verdict that the claimed invention is an impossible device is inconsistent with its verdict that the claims are anticipated and rendered obvious by the prior art; and whether the verdict form for anticipation and obviousness improperly instructed the jury to disregard portions of the claim language referring to inherent properties of the claimed invention.

This is the court's decision on EMI's motions for judgment as a matter of law and for a new trial.

## I. FACTUAL AND PROCEDURAL BACKGROUND

The court draws the following facts from the evidence presented to the jury during the trial.

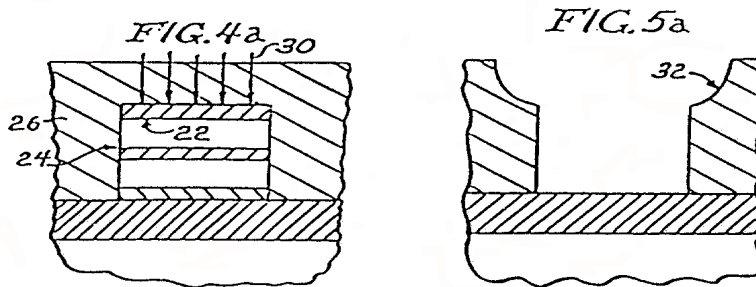
A. The Patented Technology

The patents at issue relate to fuses for disconnecting dysfunctional circuitry in semiconductor chips. Semiconductor chips commonly contain redundant circuitry, such that if any part of the circuitry is defective, it can be disconnected, allowing the redundant circuitry to take its place. The defective circuitry is disconnected by severing the portion of the “interconnect” that links it with the remainder of the circuitry. The portion of the interconnect designed to be severed to effect this substitution of circuitry is called a “fuse.” One method of severing a fuse is to irradiate it with a laser beam.

As early as 1979, semiconductor manufacturers recognized that fuses could be made from aluminum. Because aluminum reflects laser light, manufacturers found that high energy lasers were necessary to sever aluminum fuses. Due to the risk of damaging adjacent circuitry with high energy lasers, semiconductor manufacturers predominantly made fuses with polysilicon, which can be ruptured with relatively low energy lasers. In the late 1980s, semiconductor manufacturers determined that the use of aluminum fuses would permit more efficient circuit design, simplified processing, and improved reliability. The challenge faced by the inventors of the patents at issue was to develop an aluminum fuse that could be severed with a relatively low energy laser.

Paul McClure and Robert Jones are engineers who were employed in the 1980s by INMOS Corporation, a semiconductor manufacturer. Prior to 1987, McClure and Jones determined that an aluminum interconnect could be covered with a layer of a transition metal, such as titanium or tungsten, that is absorptive of laser light. According to McClure and Jones, the transition metal layer is capable of absorbing the energy of relatively low power lasers and transmitting the energy to the aluminum interconnect, which heats up and ruptures.

On January 27, 1987, McClure and Jones submitted a patent application to the U.S. Patent and Trademark Office (“PTO”), claiming a novel method for severing aluminum semiconductor fuses. The following figures illustrate the claimed invention. Figure 4a shows an aluminum interconnect (24) covered with an absorptive transition metal layer (22). The fuse is surrounded by a glass “passivation” layer (26). To sever the fuse, it is irradiated with a laser beam (30). The laser beam causes the fuse to rupture, removing the interconnect, as shown in Figure 5a.



The original claim language submitted by McClure and Jones recites a method of forming the various structural layers of the fuse. The application claimed the use of an

“optically absorptive material” on top of the interconnect, without specifying which material to use. Throughout the prosecution history, as described more fully in this court’s claim construction opinion, see EMI Group North America, Inc. v. Cypress Semiconductor Corp., 68 F. Supp.2d 421 (D. Del. 1999), the inventors progressively narrowed the scope of their invention. In particular, they specified that the absorptive layer should be comprised of “an optically absorptive transition metal.” Moreover, the inventors incorporated into the claims a recitation of how the fuse ruptures when exposed to a laser beam. In what would become claim 1 of the ’785 patent, the inventors stated that the absorptive layer “form[s] a cap to prevent evaporation of said fuse portion when said fuse portion is exposed to a directed energy source to increase the vapor pressure under the cap to produce an explosive removal of said fuse portion.” All asserted claims recite that a build-up of vapor pressure under the absorptive layer “cap” induces an explosive removal of the fuse.

On May 2, 1989, the PTO issued the ’785 patent, entitled “Metallic Fuse with Optically Absorptive Layer,” to McClure and Jones, who assigned the patent to INMOS. On June 19, 1990, the PTO issued the ’801 patent to the same inventors and assignee. The ’801 patent is a divisional patent of the ’785 patent. The ’785 patent claims a method for fabricating the fuses, and the ’801 patent claims the fuses themselves. INMOS was subsequently acquired by EMI’s parent company, which transferred the patent rights to EMI.

EMI alleges that Cypress infringes claims 1, 2, 3, 9, 10, 11, 12, 14, 17, and 18 of the '785 patent, and claims 1-5 of the '801 patent. Claim 1 of the '785 is exemplary of the other asserted claims, and recites:

1. A method of fabricating on a substrate surface a fuse forming an integral part of a metallic interconnect line joining elements in an integrated circuit, the method comprising:
  - forming a metal interconnect layer above the substrate surface;
  - forming a layer of an optically absorptive refractory transition metal above said metal interconnect layer, said refractory metal having a higher boiling point than said metal interconnect layer;
  - defining said metal interconnect layer and said optically absorptive layer into a patterned metallic interconnect for the integrated circuit including a fuse portion therein, said refractory metal forming a cap to prevent evaporation of said fuse portion when said fuse portion is exposed to a directed energy source to increase the vapor pressure under the cap to produce an explosive removal of said fuse portion; and
  - removing said fuse portion from said interconnect line by exposing said optically absorptive refractory metal to directed energy source that explosively removes said fuse portion without damaging the substrate.

B. The Accused Products

EMI contends that three fuses produced by Cypress infringe the asserted claims: the RAM 3, RAM 4, and RAM 5. Cypress submitted the following figure to illustrate its RAM 3 fuse, which is similar in structure to the other accused fuses:

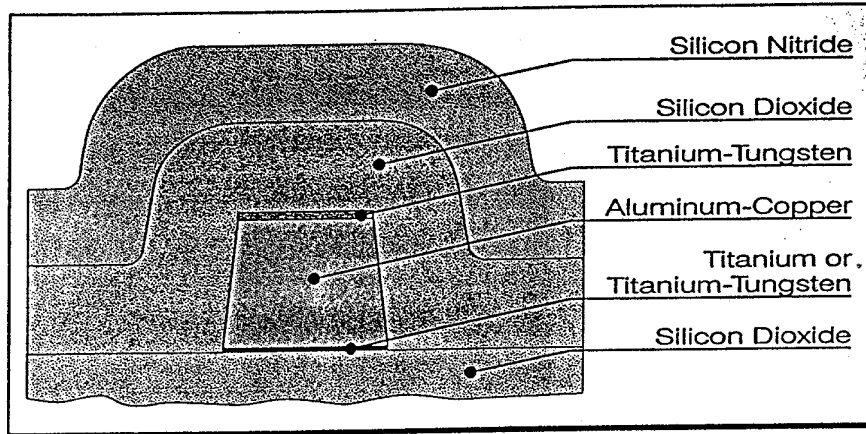


Figure 4. Cypress' RAM 3 Fuse Structure

As shown in the diagram, Cypress covers the interconnect layer in its fuses with an absorptive layer made from a titanium-tungsten alloy. The fuse structure is encased in a glass passivation layer.

C. Claim Construction

On September 30, 1999, the court issued an opinion construing disputed claims of the '785 and '801 patents. The court found, among other things: (1) that the term "fuse" in the preambles of the asserted claims is not a claim limitation; (2) that the claim term "an optically absorptive refractory transition metal" of claim 1 of the '785 patent refers only to pure transition metals, and does not refer to alloys; and (3) that the claim term "thereby inducing an explosion" of claim 1 of the '801 patent means "whereby the vaporization induces an explosion."



#### D. The Trial

On October 18, 1999, the parties commenced a two-week jury trial. Following is a description of the contentions of the parties, and a summary of the expert witness testimony presented in support of the parties' positions.

##### 1. Cypress's contentions

Cypress contends that its fuses do not infringe the patents at issue. Cypress asserts that when its fuses are irradiated with a laser beam, the aluminum interconnect layer expands and cracks the glass passivation layer. Cypress argues that no vapor pressure builds up underneath the titanium-tungsten absorptive layer, and so its fuses do not rupture through a vapor-induced explosion, as required by the claims in suit. Cypress contends, moreover, that the absorptive layer it employs is made of a titanium-tungsten alloy, and that the '785 patent may only be infringed by a fuse using a single transition metal as an absorptive layer.

Cypress also argues that the claims at issue are invalid. Cypress asserts that the claimed mechanism, whereby the aluminum interconnect vaporizes underneath the absorptive layer, is scientifically impossible, and that the claims are thus invalid under 35 U.S.C. § 101 for lack of utility, and under 35 U.S.C. § 112 for lack of enablement. Cypress also contends that the structure of the claimed invention (i.e., an aluminum interconnect covered by a layer of an optically absorptive transition metal) is not novel, and that the prior art discloses numerous structures that render the asserted claims

invalid under 35 U.S.C. § 102 for anticipation and under 35 U.S.C. § 103 for obviousness. Cypress contends that the language of the claims reciting a vapor-induced explosion should be disregarded when comparing the claims at issue to the prior art, because this language describes the inherent mechanism by which the fuses purportedly rupture.

2. EMI's contentions

EMI argues that Cypress's fuses infringe the asserted claims, because Cypress's fuses comprise the same layered structure disclosed in the claims, and because Cypress's fuses rupture through a vapor-induced explosion. EMI contends that Cypress's use of a titanium-tungsten alloy in the absorptive layer is equivalent to using "an optically absorptive refractory transition metal," as required by claim 1 of the '785 patent.

EMI argues that the claimed mechanism is not impossible, because a quantity of vapor builds up under the absorptive layer of the claimed fuses, and this buildup of vapor pressure induces an explosion that serves to sever the fuse. EMI argues that the asserted claims are not invalid for anticipation or obviousness, because the prior art does not disclose the use of a vapor-induced explosion to sever fuses.

3. Bernstein

Cypress called Joseph Bernstein, who is an Assistant Professor of Reliability in the Materials and Nuclear Engineering Department at the University of Maryland.

Bernstein has conducted research for the past nine years on metal fuse structures for integrated circuits and processes for severing them with laser energy. He has developed models of a number of fuses to determine how laser light induces them to rupture.

Bernstein testified that aluminum does not begin to vaporize in substantial quantities until heated to approximately 2400°C, its boiling point. He testified that aluminum expands as it is heated. Bernstein stated that when aluminum is embedded in a fuse, by the time the aluminum is heated to “somewhere around a thousand, maybe as much as 1200 [degrees centigrade] on the outside,” the passivation layer surrounding the aluminum would crack under the stress of expansion. Bernstein stated that the vapor pressure exerted on the absorptive layer would not “amount to anything, really, as compared to the enormous thermal strains of just the expansion of solid to liquid.” Bernstein testified that “vapor pressure cannot cause the metal fuses described in [the asserted patents] to explode,” and that “those patents are inoperable or impossible because a fuse cannot explode due to vapor pressure as described in the patents.”

Bernstein stated that, given the difficulty of observing the way the fuses rupture, he could be wrong in his opinion that the claimed mechanism is impossible. However, he testified that regardless of how the fuses actually rupture, the mechanism by which they rupture is an inherent characteristic of the fuses. He stated:

I've been studying the mechanism of laser-cutting metal lines for the sake of understanding what's happening. If it turns out that my research and my information is not correct, it doesn't change how it's removed; it just perhaps changes how we understand that it's removed. But the inherent property of the material will behave as it will behave in nature.

Bernstein testified that if the claimed structure explodes according to the mechanism described in EMI's patents, then a number of other prior art references would rupture in the same way. Bernstein stated:

My understanding about what happens in the real world is that the process of cutting would not be due to vaporization. However, as I said, if I am found to be wrong, and if it is found that the patent is, in fact, based on good science and is correct, then [the prior art structure] would explode in very exactly the same manner as the patents in suit.

Bernstein reviewed a number of prior art references which he asserted anticipate or render obvious the claimed inventions. He referred to Japanese Patent Application No. SHO 58[1983]-165347 which was filed by Toshiba Corp. on March 26, 1982. The Toshiba reference discloses a semiconductor fuse comprising a metal interconnect covered with a molybdenum layer which is irradiated by a laser to sever the fuse. The Toshiba reference states that the fuse melts from the energy of the laser.

Bernstein discussed U.S. Patent No. 4,531,144, which was issued to Scott Holmberg on July 23, 1985. The Holmberg patent discloses the use of a metal interconnect structure covered by a layer of a transition metal, such as titanium, tungsten, or tantalum.

He described U.S. Patent No. 4,556,897, which was issued to Massaharu Yorikane on December 3, 1985. The Yorikane patent discloses the use of an aluminum wire for use in semiconductors that is coated with a film of a refractory transition metal to reduce corrosion.

He discussed U.S. Patent No. 3,740,523, which was issued to Melvin Cohen on June 19, 1973. The Cohen patent discloses the use of a refractory metal, such as platinum, on top of aluminum semiconductor circuitry, to improve the absorption of laser light to facilitate the cutting of the aluminum.

And, Bernstein referred to an August 1976 article by James North and Walter Weick entitled “Laser Coding of Bipolar Read-Only Memories.” The North & Weick article discusses a method of severing titanium-platinum links between memory cells by vaporizing the links with a laser.

Bernstein testified that the Toshiba, Holmberg, and Yorikane references each teach the use of the structure claimed in the patents-at-issue, i.e., an aluminum wire for use in semiconductors that is coated with a transition metal layer. Bernstein noted that the Toshiba reference expressly discloses the use of this structure as a fuse that is severable by a laser pulse. He acknowledged that neither Toshiba, Holmberg, nor Yorikane teach the use of a vapor-induced explosion to rupture the structure. Bernstein testified, however, that if the vaporization mechanism accurately describes the removal of the claimed fuse, then this mechanism is also inherent to Toshiba, Holmberg, and

Yorikane, and so they each anticipate the claimed inventions. Bernstein testified that these three references, in combination with the Cohen patent and the North & Weick article, also render the claimed inventions obvious.

Bernstein testified that there are substantial differences between using a titanium-tungsten alloy and using a pure transition metal as an absorptive layer. Bernstein stated that tungsten is more absorptive of laser light than titanium, but that titanium adheres better to silicon. Bernstein testified that using the proper alloy conferred a substantial benefit upon the performance of Cypress's fuses.

In describing the absorptive transition metal layer he uses in one of his research fuses, Bernstein stated that: “[a]nd it has a Ti/tungsten or a – let me think. This is titanium. I think this is pure titanium, although it really matters not too much.”

Bernstein testified that a substantial portion of each Cypress fuse remains after the fuse is initially ruptured, such that the fuse may still conduct electricity, and that the remaining portion is removed by additional laser energy after the initial rupture. Bernstein stated: “A substantial amount of the aluminum is gone, but the disconnection is not formed until after the explosion and the laser then continues to then break whichever portion of the material it will then break.”

#### 4. Fair

EMI called Richard Fair, who is a Professor of Electrical and Computer Engineering at Duke University. Fair described the structure of Cypress's fuses, and

offered his opinion that they rupture by means of a vapor-induced explosion. He stated:

So there are a number of competing things going on, probably complimentary, but it's my opinion that in all three products, the RAM 3, RAM 4, and RAM 5, the surface gets a buildup of vapor pressure, and that's what causes the explosive removal. When this blows, the contents of the fuse shoot out on the order of the speed of sound. And mostly a lot of it is in a vapor form. Some will still be in a melted form, because it hasn't all vaporized.

Fair testified that because the interconnect is constrained under a transition metal "cap," and is surrounded by a glass passivation layer, the aluminum becomes progressively hotter when irradiated by a laser, and exceeds 2400°C, at which point it becomes superheated. Fair explained that "[t]hat's well above vapor temperature . . . . But the fuse is still in its solid form. It doesn't change its shape." Fair stated that the superheated aluminum is "a bomb waiting to blow."

Fair testified that he took samples of Cypress's fuses to an independent laboratory to analyze how they explode. He showed the jury scanning electron microscope (SEM) images of blown and unblown fuses. The image reproduced below shows an array of Cypress fuses, with the three fuses on the left having been blown by a laser pulse.



Referring to the blown fuses, Fair observed that the sidewalls of the fuses were blown out from the bottom, and that this was an indication that the entire interconnect layer had become sufficiently hot to explode. He stated: “And, in fact, the fact that there is no material here actually, indicates that the explosion occurred from a bottom point. And this means that this structure got a lot hotter than 1200 degrees in order to create this type of explosion.” Fair stated that he identified metallic nodules scattered around the blown fuses, and that a laboratory analysis determined that these nodules were aluminum. Fair testified: “So this would be aluminum that was, in fact, resident in the bottom of the fuse somewhere which was molten at the time of the explosion, and it blows out.”

Fair testified that the tungsten-titanium alloy used by Cypress in its absorptive layer was equivalent to using a pure transition metal, as covered by the claims of the '785 patent. He also testified that the Cypress fuses are “capable of being blown with a single laser pulse,” and that no prior art reference discloses the vapor-induced explosion claimed in the patents-at-issue.



## 5. The Jury's Verdict

On October 29, 1999, the jury returned its verdict, finding the asserted claims noninfringed, and invalid for lack of utility, lack of enablement, anticipation, and obviousness. Following is a description of the verdict form used.

### a. infringement

For each asserted claim, the verdict form contained a claim chart instructing the jury to mark “YES” or “NO” for each claim element present or absent in the accused devices. The claim chart contained separate columns for the jury to mark whether the claim elements were infringed literally or under the doctrine of equivalents. For claim 1 of the '785 patent, which is exemplary of the other asserted claims, the jury marked “NO” for literal infringement and infringement under the doctrine of equivalents for each of the following claim elements: (1) “forming an layer of an optically absorptive refractory transition metal above said metal interconnect layer”;<sup>1</sup> (2) “said refractory metal forming a cap to prevent evaporation of said fuse portion when said fuse portion is exposed to a directed energy source to increase the vapor pressure under the cap to produce an explosive removal of said fuse portion;” and (3) “removing said fuse portion from said interconnect line by exposing said optically absorptive refractory

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<sup>1</sup>The jury was instructed to determine only whether Cypress's products infringed this claim limitation under the doctrine of equivalents, as the court's claim construction precluded a finding of literal infringement.

metal to directed energy source that explosively removes said fuse portion without damaging the substrate.”

b. utility and enablement

The verdict form asked the jury to determine whether the asserted claims were invalid for lack of utility and lack of enablement. For claim 1 of the '785 patent, which is exemplary of the other asserted claims, the verdict form quoted the claim language, “said refractory metal forming a cap to prevent evaporation of said fuse portion when said fuse portion is exposed to a directed energy source to increase the vapor pressure under the cap to produce an explosive removal of said fuse portion,” and asked the jury whether this fuse-removal mechanism “is physically impossible in the structure described in the claim.” The jury answered “YES” for all asserted claims.

c. inherency

The verdict form instructed the jury to determine whether the fuse removal mechanism described in the asserted claims is an inherent property of the claimed structure. The verdict form instructed the jury to assume that the fuse removal mechanism described in the claim is not an impossible device, regardless of the jury’s verdict on utility and enablement. For claim 1 of the '785 patent, which is exemplary of the other asserted claims, the verdict form quoted portions of the claim language, and underlined language referring to the allegedly inherent properties, as follows:

said refractory metal forming a cap to prevent evaporation of said fuse portion when said fuse portion is exposed to a directed energy source to increase the vapor pressure under the cap to produce an explosive removal of said fuse portion

and

removing said fuse portion from said interconnect line by exposing said optically absorptive refractory metal to directed energy source that explosively removes said fuse portion without damaging the substrate

The verdict form asked the jury whether the underlined language describes an “inherent property, law of nature, natural phenomenon, or a new use for an old structure.” The jury answered “YES” for all asserted claims.

d. anticipation

The verdict form asked the jury to determine whether the asserted claims are invalid for anticipation. The verdict form instructed the jury to assume that the fuse removal mechanism described in the claim is not an impossible device, regardless of the jury’s verdict on utility and enablement. The verdict form instructed the jury that, if they had found that the fuse-removal mechanism described in the claims is an inherent property of the claimed structure, the jury should disregard the claim language underlined above for the purposes of rendering a verdict on anticipation. The jury found that claim 1 of the ’801 patent was anticipated by the Toshiba patent; that claim 2 of the ’801 patent was anticipated by the Yorikane patent; that claim 3 of the ’801 patent was anticipated by the Toshiba patent; that claim 4 of the ’801 patent was

anticipated by the Holmberg patent and by the Yorikane patent; and that claim 5 of the '801 patent is anticipated by the Toshiba patent (the verdict form did not ask the jury to determine whether the claims of the '785 patent are invalid for anticipation).

e. obviousness

The verdict form asked the jury to determine whether the asserted claims are invalid for obviousness. The verdict form instructed the jury to assume that the fuse removal mechanism described in the claim is not an impossible device, regardless of the jury's verdict on utility and enablement. The verdict form instructed the jury that, if they had found that the fuse-removal mechanism described in the claims is an inherent property of the claimed structure, the jury should disregard the claim language underlined above for the purposes of rendering a verdict on obviousness. The jury found that claims 1, 2, 3, 9, 10, and 18 of the '785 patent would have been obvious in light of the Toshiba, Holmberg and Cohen patents; that claims 11, 12, and 14 of the '785 patent would have been obvious in light of the Toshiba, Holmberg, and Cohen patents and the North & Weick article; that claims 1 and 3 of the '801 patent would have been obvious in light of the Toshiba, Holmberg and Cohen patents; that claim 4 of the '801 patent would have been obvious in light of the Toshiba, Holmberg, Cohen, and Yorikane patents; that claim 2 of the '801 patent would have been obvious in light of the Toshiba, Holmberg, Cohen, Yorikane and Ang patents; and that claim 5 of the

'801 patent would have been obvious in light of the Toshiba, Holmberg and Cohen patents.

6. Post-trial proceedings

On November 18, 1999, EMI moved pursuant to Fed. R. Civ. P. 50(b) for judgment as a matter of law, and pursuant to Fed. R. Civ. P. 59(a) for a new trial. EMI contends that it is entitled to judgment as a matter of law because Cypress did not prove that the claims require a physical impossibility; because no single prior art reference, or combination of references, discloses the use of a vapor-induced explosion; and because the evidence requires a finding of infringement.

EMI argues that it is entitled to a new trial because the jury's verdict of impossibility, obviousness, anticipation, and noninfringement is irreconcilably inconsistent; because the jury instructions and verdict form improperly instructed the jury to disregard elements of the claim language for rendering a verdict on anticipation and obviousness; because the court's claim construction was wrong; and because the verdict was not supported by the evidence.

II. DISCUSSION

A. EMI's Motion for Judgment as a Matter of Law

The court may grant EMI's motion for judgment as a matter of law only if "there is no legally sufficient evidentiary basis for a reasonable jury" to have found for

Cypress on an issue. See Fed. R. Civ. P. 50(a). A district court may overturn a jury's verdict on a motion for judgment as a matter of law only if, upon the trial record, a reasonable jury could not have reached that verdict. See Embrex, Inc. v. Service Engineering Corp., 2000 WL 827315, at \*2 (Fed. Cir. June 28, 2000).

1. Was there substantial evidence that Cypress has not infringed the asserted claims of the '785 patent?

The jury found that Cypress has not infringed claim 1 of the '785 patent, from which the other asserted claims of the '785 patent depend. In response to the interrogatories in the verdict form, the jury identified three elements of claim 1 that it found do not read on Cypress's accused processes, as identified in the above description of the verdict form. The court will consider these three claim elements in turn.

- a. “forming a layer of an optically absorptive refractory transition metal above said metal interconnect layer”

EMI argues that, as a matter of law, Cypress infringes the claim element “forming a layer of an optically absorptive refractory transition metal above said metal interconnect layer” of claim 1 of the '785 patent. The parties do not dispute that Cypress uses a titanium-tungsten alloy as an absorptive metal above the interconnect layer, and thus that Cypress does not literally infringe this claim element under the court's claim construction. EMI argues, however, that the evidence conclusively demonstrates that Cypress infringes this claim element under the doctrine of

equivalents. EMI refers to the trial testimony of Bernstein, who described his research on fuses by stating that “[a]nd it has a Ti/tungsten or a – let me think. This is titanium. I think this is pure titanium, although it really matters not too much.”

Cypress contends that it presented substantial evidence supporting the jury’s verdict. Cypress refers to Bernstein’s testimony that titanium and tungsten exhibit different characteristics relating to laser light absorption and adherence to silicon, and that an alloy of titanium and tungsten can achieve characteristics superior to those of elemental metals.

The court notes that Bernstein testified that titanium is more adherent to silicon than tungsten, and that tungsten is more absorptive of laser light than titanium. Bernstein testified that the use of a titanium-tungsten alloy can result in fuses with better characteristics than fuses with absorptive layers made of pure elemental metals. The court finds that this testimony constitutes substantial evidence in support of the jury’s finding that Cypress’s titanium-tungsten absorptive layers are not equivalent to absorptive layers made from pure elemental metals, as recited in claim 1 of the ’785 patent.

- b. “said refractory metal forming a cap to prevent evaporation of said fuse portion when said fuse portion is exposed to a directed energy source to increase the vapor pressure under the cap to produce an explosive removal of said fuse portion”

EMI argues that it presented substantial evidence that the cap layer of Cypress’s fuse structure prevents evaporation to increase the vapor pressure under the cap to produce an explosive removal of the fuse. EMI relies on the testimony of Fair, who discussed the SEM image reproduced above, and stated that it shows that the interconnect layer becomes sufficiently hot that the aluminum vaporizes, and that an explosion blows out the bottom part of the fuse.

Cypress argues that Bernstein’s testimony provides a substantial basis for the jury’s finding that Cypress’s fuses are not blown through a vapor-induced explosion. Cypress refers to Bernstein’s testimony that essentially no vapor pressure could build up in the fuse, and that any explosion in Cypress’s fuse-severing process is caused by thermo-mechanical stress as the aluminum layer of the fuse expands in its solid or liquid states.

The aluminum interconnect used by Cypress is covered by a thin layer of a transition metal alloy and encased in glass. Bernstein’s testimony indicates that aluminum expands as it is heated, and that the fuse will crack at approximately 1000°C to 1200°C, which is substantially below the 2400°C boiling point of aluminum. According to Bernstein, the interconnect would produce essentially no vapor prior to



the time at which it expands and cracks the passivation layer. The court finds that the jury could reasonably determine that Cypress's fuses crack and rupture before the aluminum begins to vaporize.

- c. “removing said fuse portion from said interconnect line by exposing said optically absorptive refractory metal to directed energy source that explosively removes said fuse portion without damaging the substrate.”

EMI argues that the evidence demonstrates that Cypress's fuses are explosively removed without damaging the substrate. It refers to the SEM image reproduced above of Cypress's blown fuses, and argues that the image shows that the substrate is undamaged by the explosion.

Cypress argues that the fuses are not explosively removed, and that when they are blown through thermo-mechanical stress, the substrate is damaged. Cypress refers to Bernstein's testimony that the vapor pressure created by the heating is insubstantial in comparison to the stress caused by the expansion of the aluminum. Cypress also refers to the SEM image reproduced above which shows disturbances to the surfaces below and at the bottom corners of the blown fuses, which the jury could reasonably conclude was “damage[] [to] the substrate.”

As discussed above, the jury could reasonably find that the fuses are not explosively removed. Moreover, the SEM image relied upon by EMI shows circular regions at the bottom corners of the blown fuses, which are absent from the bottom

corners of the unblown fuse. The court finds that the jury could reasonably conclude that the circular regions in the SEM image represent damage to the substrate. Accordingly, the court finds that substantial evidence supports the jury's verdict that Cypress does not infringe this claim element.

2. Was there substantial evidence that Cypress has not infringed claims 1-4 of the '801 patent?

The jury found that Cypress has not infringed claim 1 of the '801 patent, from which claims 2-4 depend. In the interrogatories provided in the verdict form, the jury stated that Cypress's fuses do not embody the following three elements of claim 1: (1) "said upper layer forming an explosion-inducing cap;" (2) "said layered interconnect configured such that a laser light directed on said upper layer is absorbed thereby and causes said lower layer to vaporize before said upper layer vaporizes thereby inducing an explosion which substantially removes said layered interconnect structure;" and (3) "removing said fuse portion from said interconnect line by exposing said optically absorptive refractory metal to directed energy source that explosively removes said fuse portion without damaging the substrate." These claim elements each refer to a vapor-induced explosion. As discussed above, Cypress presented substantial evidence at trial to show that its fuses are blown through thermo-mechanical stress, and not by an increase in vapor pressure. The court finds that substantial evidence supports the jury's verdict of non-infringement of these claims.

3. Was there substantial evidence that Cypress has not infringed claim 5 of the '801 patent?

The jury found that Cypress has not infringed claim 5 of the '801 patent. In the interrogatories provided in the verdict form, the jury stated that Cypress's fuses do not embody three elements of claim 5.

The first two elements identified by the jury, "a layered interconnect structure having an explosion-inducing cap which includes an upper layer of an optically absorptive material," and "such that when said layered interconnect structure is exposed to said laser light, said upper layer absorbs said laser light and transmits heat to said lower layer, said lower layer vaporizes before said upper layer causing an explosion," both refer to a vapor-induced explosion. As discussed above, there is substantial evidence to support the jury's verdict that Cypress's fuses do not meet these claim limitations.

The third element identified by the jury is "said explosion forming an opening between said elements on said integrated circuit." EMI refers to the testimony of Fair, who stated that Cypress's fuses may be blown with a single laser pulse. Cypress, on the other hand, refers to the testimony of Bernstein, who stated that a substantial portion of each Cypress fuse remains after the fuse is initially ruptured, such that the fuse may still conduct electricity. The court finds that Bernstein's testimony provides

substantial evidence in support of the jury's verdict that this claim element is not met by Cypress's fuses.

4. Does the jury's finding of inherency indicate that no reasonable jury could render a verdict of non-infringement?

The jury found that the claimed fuse-removal mechanism is an "inherent property, law of nature, natural phenomenon, or a new use for an old structure." EMI claims that, if the explosion-inducing cap claimed in its patents is an inherent property of the claimed structure, then Cypress's fuse structure must operate in the same way. EMI argues that no reasonable jury could have found noninfringement after having determined that the claimed mechanism describes an inherent property of the claimed structure.

In its claim construction briefs, and throughout trial, EMI argued that the vapor-induced explosion language of the claims is not an inherent property of the claimed devices, but is a distinct claim limitation. The jury found that Cypress's fuses do not operate according to this mechanism. Although the verdict indicates that the jury found this mechanism to be inherent to EMI's claimed structure, the jury did not necessarily find that the mechanism was inherent to Cypress's fuses. The court finds that the jury's verdicts on inherency and infringement are not inconsistent.

The court accordingly finds that substantial evidence supports the jury's verdict of non-infringement of all the asserted claims.

5. Does substantial evidence support the jury's finding that the claimed devices recite a physically impossible mechanism?

EMI argues that Cypress failed to establish that the claims disclose a physically impossible structure, because Cypress failed to present any evidence of impossibility regarding fuse structures other than the ones built by it and Bernstein. EMI argues that the trial record contains no evidence regarding whether other fuse embodiments taught by the '785 and '801 patents cannot function as described in the claims. See Atlas Powder Co. v. E.I. Du Pont de Nemours, 750 F.2d 1569, 1576 (Fed. Cir. 1984) (“Even if some of the claimed embodiments [are] inoperative, the claims are not necessarily invalid.”).

Cypress argues that substantial evidence supports the jury's verdict that the claimed mechanism is impossible, and thus that the claims are invalid for lack of enablement and utility. Cypress contends that it did not have to show that all potential embodiments of the patent are invalid, but rather, that it only had to demonstrate that a significant number of the embodiments are impossible. See Atlas Powder, 750 F.2d at 1576-77 (“[I]f the number of inoperative combinations becomes significant, and in effect forces one of ordinary skill in the art to experiment unduly in order to practice the claimed invention, the claim[] might indeed be invalid.”). Cypress refers to Bernstein's testimony that the aluminum would expand and crack the passivation layer of the fuses at roughly 1000-1200°C, a temperature less than 2400°C, the point at

which aluminum would begin to vaporize in substantial amounts, and boil. Cypress argues that the jury was entitled to draw general conclusions about the feasibility of the claimed mechanism in light of Bernstein's testimony regarding the Cypress fuses.

Where a claim limitation is impossible or inoperable, the claim may be found invalid as not "useful" under 35 U.S.C. § 101 and as lacking an enabling disclosure under 35 U.S.C. § 112. See Process Control Corp. v. HydReclaim Corp., 190 F.3d 1350, 1359 (Fed. Cir. 1999) ("[W]hen an impossible limitation . . . is clearly embodied within the claim, the claimed invention must be held invalid."); Raytheon Co. v. Roper Corp., 724 F.2d 951, 956-57 (holding that a claim containing a limitation impossible to meet may be held invalid under either § 101 or § 112). A common aspect of all embodiments of the claimed invention is that vapor pressure must sufficiently build up underneath the transition metal cap to induce an explosion. Bernstein's testimony indicates that, due to the relatively high boiling point of aluminum, any fuse having the claimed structure will rupture from the thermomechanical stress of the expansion of the aluminum, rather than from the vaporization of the aluminum. This testimony is applicable to all embodiments of the claimed fuses. Bernstein's testimony constitutes substantial evidence in support of the jury's conclusion that the claimed inventions are invalid for lack of utility and lack of enablement.

6. Does substantial evidence support the jury's finding that the claims-in-suit were anticipated by the prior art?

EMI argues that no reasonable jury could have concluded that the claims at issue are anticipated by the prior art. EMI contends that the claimed devices recite the use of a vapor-induced explosion. EMI asserts that no prior art device at issue in this case discloses the use of a vapor-induced explosion to sever a fuse. Accordingly, EMI argues, the prior art cannot anticipate the claims.

Cypress argues that the claims at issue disclose a simple device of an aluminum interconnect covered by a transition metal layer. Cypress contends that this structure had been repeatedly disclosed in the prior art, such as in the Toshiba, Holmberg, and Yorikane references. Cypress states that the prior art devices, like the claimed fuses, are severed when irradiated with a laser. Cypress argues that, because the fuses are so small and the duration of the explosion is so short, it is impossible for anyone to know precisely how these fuses rupture. Cypress refers to the testimony of Bernstein, who stated that it is possible, although unlikely, that the prior art fuses rupture according to a vapor-induced explosion. Bernstein stated:

My understanding about what happens in the real world is that the process of cutting would not be due to vaporization. However, as I said, if I am found to be wrong, and if it is found that the patent is, in fact, based on good science and is correct, then [the prior art structure] would explode in very exactly the same manner as the patents in suit.

Cypress acknowledges that the Toshiba, Holmberg, and Yorikane references do not expressly disclose the use of a vapor-induced explosion to sever an interconnect. Nonetheless, Cypress argues, the devices disclosed in the Toshiba, Holmberg, and Yorikane references may, depending on the underlying science, inherently rupture according to a vapor-induced explosion. Cypress argues that the jury was entitled to assume, for the limited purpose of rendering a verdict on anticipation and obviousness, that the claimed mechanism was not impossible. Cypress contends that, under this assumption, there was substantial evidence by which the jury could find the claims anticipated and rendered obvious by the prior art.

To find a patent claim invalid for anticipation under 35 U.S.C. § 102, the jury had to find by clear and convincing evidence that a single prior art reference discloses each element of the claim. See Kloster Speedsteel AB v. Crucible Inc., 793 F.2d 1565, 1571 (Fed. Cir. 1986). A prior art reference might not expressly describe all of the physical characteristics of the disclosed structure, such as its melting point. Physical properties such as melting points are considered “inherent” to the reference. See In re Donohue, 766 F.2d 531, 534 (Fed. Cir. 1985). A prior art reference that is silent as to one of its physical characteristics may anticipate a subsequently claimed invention that explicitly recites the previously-undisclosed feature, if “the missing descriptive matter is necessarily present in the thing described in the reference, and . . . it would be so recognized by persons of ordinary skill.” Continental Can Co. v. Monsanto Co., 948



F.2d 1264, 1268 (Fed. Cir. 1991). To show that a prior art reference inherently anticipates a claimed invention, it is necessary to show that each element of the claims is present, either expressly or inherently, in the prior art reference. See Minnesota Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics Inc., 976 F.2d 1559, 1565 (Fed. Cir.1992) (holding that to establish anticipation, a party “must show that each element of the claim in issue is found, either expressly or under principles of inherency, in a single prior art reference”).

The verdict form asked the jury to determine whether the fuse-removal mechanism recited in the claims is an inherent property of the claimed structure. After the jury answered this question in the affirmative, the verdict form instructed the jury to disregard the portion of the claims referring to the fuse-removal mechanism for the purpose of determining whether certain prior art references anticipated the claimed invention. This instruction improperly directed the jury to disregard elements of the claims when determining if they were invalid for anticipation. The verdict form should have directed the jury to consider whether each element of the claims, including the portions of the claims referring to the fuse-removal mechanism, is disclosed by the prior art. See id.

For the purposes of EMI’s motion for judgment as a matter of law on anticipation, the court will consider if a reasonable jury could have found by clear and convincing evidence that each element of the asserted claims, including the fuse-

removal mechanism, is disclosed in a single prior art reference. See id. Because the parties do not dispute that the prior art does not expressly disclose the use of a vapor-induced explosion to sever a fuse, the court will consider whether a reasonable jury could have found by clear and convincing evidence that the prior art inherently discloses a vapor-induced explosion.

Bernstein repeatedly emphasized that, in his opinion, the claimed vapor-induced explosion is a scientifically impossible mechanism. Bernstein testified that he could be wrong in his opinion, and that it is plausible that fuses, like those in the prior art, rupture through a vapor-induced explosion. He testified, however, that “certainly if I have [the fuse] contained in a glassy structure, there’s not going to be any vapor pressure that will amount to anything, really, as compared to the enormous thermal strains of just the expansion of solid to liquid.”

Fair testified that none of the prior art devices identified by Cypress disclose a vapor-induced explosion analogous to that disclosed in the patents-at-issue, and he gave his opinion that none of the references anticipate or render obvious the claimed inventions.

Because of the doubt that Bernstein cast on the claimed explosive removal mechanism, and because Fair testified that none of the prior art exhibit this mechanism, the court finds that no reasonable jury could have found by clear and convincing evidence that the claims-at-issue inherently disclose the claimed fuse-removal

mechanism. Because the prior art does not disclose a vapor-induced explosion, no reasonable jury could find that the prior art anticipates the claims at issue. The court will grant EMI's motion for judgment as a matter of law that the asserted claims are not invalid under 35 U.S.C. § 102 for anticipation.

7. Does substantial evidence support the jury's finding that the claims-in-suit were rendered obvious by the prior art?

EMI argues that no reasonable jury could have found by clear and convincing evidence that the claims are invalid for obviousness, because no prior art reference discloses the use of a vapor-induced explosion for rupturing fuses.

As it argued regarding anticipation, Cypress contends that there is substantial uncertainty in how the fuses rupture, and that a reasonable jury could have concluded that the prior art fuses rupture according to a vapor-induced explosion.

A jury may invalidate a claim for obviousness when the differences between the claimed subject matter and the prior art are such that "the subject matter as a whole would have been obvious to a person having ordinary skill in the art." 35 U.S.C. § 103. There is a strong presumption against finding claims invalid for obviousness when the prior art does not disclose every element of the claimed invention. See Al-Site Corp. v. VSI International, Inc., 174 F.3d 1308, 1324 (Fed. Cir. 1999) ("Rarely, however, will the skill in the art component operate to supply missing knowledge or prior art to reach an obviousness judgment."). As discussed in the context of the jury's

verdict on anticipation, both Bernstein and Fair testified that they did not believe that the prior art fuses rupture according to a vapor-induced explosion. The court finds that no reasonable jury could find by clear and convincing evidence that a person of ordinary skill in the art would find the claimed invention obvious in light of the prior art. The court will grant EMI's motion for judgment as a matter of law that the asserted claims are not invalid for obviousness.

8. Was the jury entitled to find that the asserted claims include mechanisms that are an inherent property, law of nature, natural phenomenon, or a new use for an old structure?

The jury responded affirmatively to the interrogatory on the verdict form asking whether the asserted claims include mechanisms that are an inherent property, law of nature, natural phenomenon, or a new use for an old structure.

The court has determined that it was improper to ask whether the claims recite inherent properties of the claimed invention so that such properties could be disregarded in an anticipation or obviousness analysis. The pertinent inquiry was whether the prior art inherently discloses the claimed fuse-removal mechanism, not whether the fuse-removal mechanism is an inherent characteristic of the claimed structure. The court finds that the jury's conclusion that the fuse-removal mechanism is an inherent property of the claimed structure has no legal significance.

B. EMI's Motion for a New Trial

The decision as to whether a new trial should be granted is within the discretion of the trial court. Georgia-Pacific Corp. v. U.S. Gypsum Co., 195 F.3d 1322, 1333 (Fed. Cir. 1999). Federal Rule of Civil Procedure 59(a) permits the court to order a new trial “for any of the reasons for which new trials have heretofore been granted in actions at law in the courts of the United States.” Fed. R. Civ. P. 59(a). Although Rule 59(a) does not specify the grounds on which a district court can grant a new trial, Federal Rule of Civil Procedure 61 provides that the court should not order a new trial unless “substantial justice” so requires. Fed. R. Civ. P. 61. Rule 61 also instructs the court to disregard any “error or defect in the proceeding which does not affect the substantial rights of the parties.” Id.

1. Were the jury's findings inconsistent and irreconcilable?

The jury found that the claims describe a physically impossible mechanism, that the claims describe an “inherent property, law of nature, natural phenomenon, or a new use for an old structure,” and that they are invalid for anticipation and obviousness. EMI contends that the jury's finding of impossibility cannot be reconciled with the jury's other findings. EMI argues that an impossible mechanism cannot be inherent in nature, that it cannot have been anticipated by the prior art, and that people of ordinary skill in the art could not find an impossible mechanism to be obvious. EMI also asserts that the jury's finding that the Cypress fuses do not have a cap to “prevent evaporation

of said fuse portion when said fuse portion is exposed to a directed energy source to increase the vapor pressure under the cap” cannot be reconciled with the jury’s finding that this language is an “inherent property, law of nature, natural phenomenon or new use of an old structure.” EMI argues that these alleged inconsistencies mandate a new trial.

Cypress argues that the jury’s verdict is not inconsistent. Cypress notes that the verdict form instructed the jurors that, for the purposes of the inherency, obviousness, and anticipation verdicts, they should assume that the claimed process was not impossible. Cypress observes that the verdict form did not ask the jury to find that the claimed mechanism was simultaneously impossible and inherent. Cypress contends that the verdict form asked the jury to independently consider the theories of impossibility, inherency, obviousness, and anticipation. Cypress refers to the testimony of Bernstein that:

My understanding about what happens in the real world is that the process of cutting would not be due to vaporization. However, as I said, if I am found to be wrong, and if it is found that the patent is, in fact, based on good science and is correct, then [the prior art structure] would explode in very exactly the same manner as the patents in suit.

Cypress contends that this testimony provides substantial evidence upon which the jury could render its verdicts of impossibility, inherency, anticipation, and obviousness.

The court notes that the jury found by clear and convincing evidence that the claims in suit are invalid because they disclose an impossible mechanism. The jury

also found by clear and convincing evidence that the claimed invention is anticipated and rendered obvious by the prior art. These verdicts are difficult to reconcile. When an inconsistency in a jury's verdict "undermines the judgment entered," a court must grant a new trial. Riley v. KMart Corp., 864 F.2d 1049, 1054 (3d Cir. 1989) ("[T]he fundamental inconsistencies among answers in the two sets of interrogatory answers here fatally undermines the judgment entered and mandates a new trial."). In this case, the alleged inconsistencies in the jury's verdict do not draw into question the judgment entered. The jury found that Cypress did not infringe the asserted claims, and it found in Cypress's favor on three alternative grounds of invalidity. As discussed above, the court has found that substantial evidence supports the jury's finding that the patents are invalid under 35 U.S.C. §§ 101 and 112 for disclosing an impossible mechanism. This theory of invalidity, alone, is sufficient to support the judgment entered by the court. Because the alleged inconsistencies in the verdict do not affect the substantial rights of the parties, the court will not grant EMI a new trial on this ground. Fed. R. Civ. P. 61.

2. Did the verdict form contain errors?

EMI argues that the questions in the verdict form were so defective in their formulation that their submission to the jury constitutes grounds for a new trial. Among its contentions, EMI identifies the following alleged errors in the verdict form: (1) the failure to include the preamble of the claims in the claim charts used in the

infringement verdict; (2) the failure to include in the verdict form on utility and enablement an instruction that all embodiments taught by the patent must be impossible in order to find invalidity; and (3) the instruction to disregard the claim limitations referring to the vapor-induced explosion for the purpose of rendering a verdict on anticipation and obviousness.

The verdict form directed the jury to determine which, if any, of the claim elements of the asserted claims read upon Cypress's accused fuses. The claim charts included in the infringement section of the verdict form do not include the preamble of the claims. The court found in its claim construction opinion that the preambles of the claims are not claim limitations. Thus, it was not improper to omit the preambles from the claim charts in the verdict form.

As to impossibility, the verdict form asked whether Cypress had shown by clear and convincing evidence that the asserted claims “describe[] a fuse-removal mechanism that is physically impossible in the structure described in the claim.” EMI argues that, by merely asking the jury whether “the structure [i.e., singular] described in the claim” was impossible, the verdict form permitted the jury to find the claim invalid based on a finding that only one embodiment of the claim was impossible. EMI argues that the verdict form should have asked if “all structures” covered by the claims were invalid for impossibility. The court finds that the language of the verdict form sufficiently states the controlling law. See Process Control, 190 F.3d at 1359 (“[W]hen an



impossible limitation, such as a nonsensical method of operation, is clearly embodied within the claim, the claimed invention must be held invalid.”).

As to inherency, anticipation, and obviousness, the verdict form instructed the jury that, if they had found the vapor-induced explosion mechanism described in the asserted claims to describe an inherent property, law of nature, natural phenomenon, or a new use for an old structure, they should disregard the portions of the claim language referring to the inherent property. As discussed above, the verdict form improperly instructed the jury to disregard portions of the claims when comparing the claimed invention to the prior art. To find that a prior art reference anticipated, or rendered obvious, the claimed invention, the jury was required to find that the prior art necessarily disclosed each element of the claims. See Kloster Speedsteel, 793 F.2d at 1571. This requirement does not change under a theory that the prior art inherently anticipates a claimed invention. See Minnesota Mining & Mfg., 976 F.2d at 1565 (holding that to establish anticipation, a party “must show that each element of the claim in issue is found, either expressly or under principles of inherency, in a single prior art reference”).

A trial court’s error is harmless when it is “highly probable” that it did not affect the outcome of the case. McQueeney v. Wilmington Trust Co., 779 F.2d 916, 917 (3d Cir. 1985). In this case, the court has found that substantial evidence supports the jury’s verdict that the claims-at-issue are invalid under 35 U.S.C. §§ 101 and 112

because they describe an impossible device. Although the error in the verdict form may have tainted the jury's verdict as to anticipation and obviousness, this error does not undermine the jury's conclusion that the claims are invalid for lack of utility and enablement.

EMI has identified a number of other alleged errors in the verdict form, as follows:

(1) an instruction to disregard language from claim 1 of the '785 patent if the language describes "a new use for an old product"; (2) a question asking the jury whether Holmberg anticipates dependent claim 4 of the '801 patent, but not whether Holmberg anticipates base claim 1; and (3) the failure to inform the jury in the verdict form that it must answer questions about obviousness from the perspective of a person of ordinary skill in the art at the time of invention. Because these questions all concern the jury's verdict on anticipation and obviousness, and because the court will grant judgment as a matter of law in favor of EMI on these issues, the court need not address these issues in the context of EMI's motion for a new trial.

3. Were the jury instructions confusing and contrary to law?

EMI argues that eight of the court's jury instructions were so erroneous as to require a new trial. It argues: (1) that the jury instructions failed to explain why the jury did not need to consider literal infringement of claim 1 of the '785 patent; (2) that the jury instructions improperly stated that "[i]f you do not find literal infringement you may consider infringement under the doctrine of equivalents," rather than stating that

the jury was required to consider infringement under the doctrine of equivalents; (3) that the jury instructions failed to explain that the claim term “comprises” means that Cypress’s use of additional components in its fuses does not obviate infringement, insofar as Cypress’s fuses meet all elements of the asserted claims; (4) that the jury instructions on utility and enablement fail to explain that the jury must determine if all possible embodiments are physically impossible; (5) that the instructions on anticipation impermissibly directed the jury to disregard claim elements; (6) that the jury was not instructed that obviousness requires clear and convincing evidence; (7) that instructions on obviousness improperly directed the jury to disregard claim elements; and (8) that Attachment A of the jury instructions (Definition of Claim Terms) did not present the court’s claim construction in the format that it appears in the conclusion of the court’s claim construction opinion.

As stated above, the court finds that the jury instructions and verdict form improperly directed the jury to disregard elements of the claims when rendering a verdict on anticipation and obviousness. Because the court will grant EMI’s motion for judgment as a matter of law as to anticipation and obviousness, the court need not consider EMI’s motion for a new trial on these grounds.

Regarding enablement, the jury instructions stated that “[i]f the claim describes and claims something that is physically impossible, then the claim is invalid because the specification cannot demonstrate how to practice the invention.” The instruction on

utility is similar. EMI contends that it was necessary to instruct the jury that they had to find all embodiments of the invention to be physically impossible. The court finds that the jury instructions are properly grounded in Federal Circuit law. See Process Control, 190 F.3d at 1359 (“[W]hen an impossible limitation, such as a nonsensical method of operation, is clearly embodied within the claim, the claimed invention must be held invalid.”); Raytheon, 724 F.2d at 956-57 (holding that a claim containing a limitation impossible to meet may be held invalid under either § 101 or § 112).

The court has considered the remaining objections to the jury instructions advanced by EMI. The remaining issues raised by EMI do not pertain to the jury’s conclusion that the claims at issue are invalid for lack of utility and lack of enablement. Even were the court to accept that the above objections raised by EMI constitute errors in the jury instructions, it appears that such error would be harmless, and would not constitute grounds for a new trial. Accordingly, the court will deny EMI’s motion for a new trial on this ground.

4. Was the court’s claim construction incorrect?

EMI argues that it is entitled to a new trial based upon four alleged errors in the court’s claim construction. It argues: (1) that the preambles of the patents at issue are limitations; (2) that an “optically absorptive refractory transition metal” includes an alloy of pure metals; (3) that “optically absorptive” requires a reference point; and (4) that “damage to the substrate” refers to damage to the silicon substrate.

The court has considered the arguments raised by EMI during the original briefing on claim construction, and in the context of EMI's motion for reconsideration of the court's claim construction opinion. For the reasons stated in the court's claim construction opinion, the court finds that there is no basis for granting a new trial on this ground. Moreover, the alleged errors in the court's claim construction do not draw into question the jury's verdict that the asserted claims are invalid because the fuse-removal mechanism they disclose is impossible. Thus, even if the court had adopted EMI's construction of the disputed claims, it appears that the jury's verdict would be unchanged. Because the alleged errors do not affect the "substantial rights" of the parties, the court will deny EMI's motion for a new trial on this ground. Fed. R. Civ. P. 61.

5. Was the verdict contrary to the evidence?

EMI argues that it is entitled to a new trial because the verdict was contrary to the evidence. The court, as discussed in the context of EMI's motion for judgment as a matter of law, finds that substantial evidence supports the jury's findings of non-infringement and invalidity for lack of utility and enablement. Although the court has found that the evidence does not support the jury's findings of anticipation and obviousness, this ruling does not affect the judgment entered in this case.

Accordingly, the court will deny EMI's motion for a new trial.

### III. CONCLUSION

For the reasons discussed above, the court will deny EMI's motion for a new trial. Because the court finds that substantial evidence supports the jury's finding that Cypress has not infringed the claims at issue, and that the claims at issue are invalid under 35 U.S.C. § 101 for lack of utility and under 35 U.S.C. § 112 for lack of enablement, the court will deny EMI's motion for judgment as a matter of law on these grounds. The court finds that no reasonable jury could find the asserted claims to be invalid for anticipation under 35 U.S.C. § 102 or for obviousness under 35 U.S.C. § 103, and so will grant EMI's motion for judgment as a matter of law that the claims are not invalid for anticipation or obviousness.

The court previously directed that judgment be entered in favor of the defendant and against the plaintiff on the plaintiff's claims. Because Cypress seeks a declaration of invalidity of the asserted claims, the court will enter a judgment of invalidity of the claims of the '785 and '801 patents.

The court will issue an Order consistent with this Opinion.