

# United States Court of Appeals for the Federal Circuit

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**MAGSIL CORPORATION AND  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY,**  
*Plaintiffs-Appellants,*

**v.**

**HITACHI GLOBAL STORAGE TECHNOLOGIES,  
INC., HITACHI AMERICA, LTD., HITACHI DATA  
SYSTEMS CORPORATION, AND SHENZHEN  
EXCELSTOR TECHNOLOGY LTD.,**  
*Defendants-Appellees.*

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2011-1221

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Appeal from the United States District Court for the  
District of Delaware in Case No. 08-CV-0940, Judge  
Harvey Bartle, III.

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Decided: August 14, 2012

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STEVEN J. POLLINGER, McKool Smith, P.C., of Austin,  
Texas, argued for the plaintiffs-appellants. With him on  
the brief were CRIAG N. TOLLIVER, JOEL L. THOLLANDER  
and LILAN REN. Of counsel on the brief were JACK B.  
BLUMENFELD and RODGER D. SMITH, II, Morris, Nichols,  
Arsht & Tunnell LLP, of Wilmington, Delaware.

EDWARD R. REINES, Weil, Gotshal & Manges LLP, of Redwood Shores, California, argued for defendants-appellees. Of counsel on the brief were DOUGLAS E. LUMISH, JEFFREY G. HOMRIG and LAWRENCE OKEY ONYEJEKWE, JR., Kasowitz, Benson, Torres & Friedman, LLP, of San Francisco, California. Of counsel was FREDERICK L. COTTRELL, III, Richards, Layton & Finger, PA, of Wilmington, Delaware.

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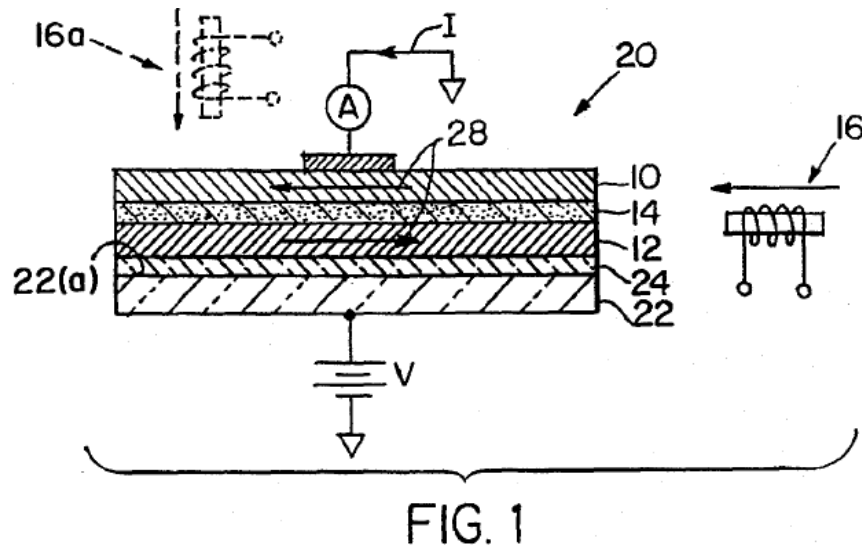
Before RADER, *Chief Judge*, O'MALLEY and REYNA, *Circuit Judges*.

RADER, *Chief Judge*.

The United States District Court for the District of Delaware granted summary judgment that claims 1-5, 23-26, and 28 of U.S. Patent No. 5,629,922 (“the ’922 patent”) are invalid for a lack of enablement. *MagSil Corp. v. Seagate Tech.*, 764 F. Supp. 2d 674 (D. Del. 2011). Because the record supports the trial court’s judgment, this court affirms.

## I.

Appellant Massachusetts Institute of Technology is the assignee of the ’922 patent and appellant MagSil Corporation is the patent’s exclusive licensee. The application leading to the ’922 patent was filed in March 1995 and issued in May 1997. The patent claims read-write sensors for computer hard disk drive storage systems. Hard disk drives store digital data in microscopic magnetic patterns on the surface of spinning platters, or disks, inside the drive.



As shown in Fig. 1, the '922 patent's sensor uses a quantum mechanical effect where electric current can pass, or "tunnel," from one electrode (e.g., 10) through a thin insulating barrier layer (14) into a second electrode (e.g., 12). '922 patent col. 1 ll. 17-21, col. 3 l. 53-col. 4 l. 29.

With two ferromagnetic electrodes, a tri-layer tunnel junction requires the current flow to depend on the magnetization direction of the electrodes. The junction resistance is higher when the magnetization direction of one electrode (e.g., 28 in 10) is antiparallel (i.e., having the opposite direction) to that of the other electrode (e.g., 28 in 12) and lower when the directions are parallel. *Id.* at col. 1 ll. 28-31. Therefore, the tunnel junction resistance changes with a change in magnetization direction. *Id.* at col. 2 ll. 18-22.

The '922 patent claims both a method of manufacturing a tri-layer tunnel junction and the junction itself. The

asserted claims, however, only claim the tunnel junction device. Claim 1 is representative of the two asserted independent claims and reads:

1. A device forming a junction having a resistance comprising:  
a first electrode having a first magnetization direction,  
a second electrode having a second magnetization direction, and  
an electrical insulator between the first and second electrodes, wherein applying a small magnitude of electromagnetic energy to the junction reverses at least one of the magnetization directions and causes **a change in the resistance by at least 10% at room temperature.**

*Id.* at col. 8 ll. 43-54 (emphasis added).

According to the background section of the '922 patent's specification, scientists had known "for many years" the basic theory underlying "tunnel resistance arising from conduction electron spin polarization." *Id.* at col. 2 ll. 3-5. Past efforts, however, failed to "produce an adequate level of change in the tunneling resistance ( $\Delta R/R$ )" for practical applications. *Id.* at col. 2 ll. 5-8. At room temperature, these past efforts had obtained only a 2.7% change in resistance. *Id.* at col. 1 ll. 60-67. The '922 invention, by contrast, achieved a "ten percent change in the tunneling resistance with respect to magnetic field (H) variation"; in some cases "as much as 11.8% change was seen." *Id.* at col. 2 ll. 44-51.

The specification further teaches that

[t]his increase in  $\Delta R/R$  is believed to depend, inter alia, on a decrease in surface roughness, which apparently directly couples the two electrodes ferromagnetically. Also, the quality of the inter-

vening insulator between the [electrodes] is significantly improved over the prior art devices. This is believed to be important in keeping the surface integrity of the [electrodes].

*Id.* at col. 2 ll. 51-58. The asserted claims, however, do not include the process steps of fabricating the device and require neither smoother layers nor a specifically improved insulator. The specification also explains manufacture of the tri-layer tunnel junction and ways to incorporate this device into read-write sensor heads for data storage. *Id.* at col. 3 l. 52-col. 4 l. 38, col. 6 l. 66-col. 8 l. 36.

MagSil filed suit in December 2008 against several defendants including Hitachi Global Storage Technologies, Inc., Hitachi America, Ltd., Hitachi Data Systems Corporation, and Shenzhen Excelstor Technology, Ltd. (collectively, “Hitachi”), alleging that their disk drive products infringe the ’922 patent. The non-Hitachi defendants have since been dismissed from the case. Chief Judge Harvey Bartle III, sitting by designation from the United States District Court for the Eastern District of Pennsylvania, handled this litigation. After *Markman* proceedings, the parties filed cross-motions for summary judgment. The district court found the asserted claims invalid as a matter of law for lack of enablement. The district court entered its final judgment for Hitachi and MagSil timely appealed to this court, which has jurisdiction under 28 U.S.C. § 1295(a)(1).

## II.

This court reviews a district court’s grant of summary judgment without deference, “drawing all reasonable inferences in favor of the nonmovant.” *Green Edge Enters., LLC v. Rubber Mulch Etc., LLC*, 620 F.3d 1287, 1295 (Fed. Cir. 2010) (citing *Anderson v. Liberty Lobby*,

*Inc.*, 477 U.S. 242, 255 (1986)); *see also* Fed. R. Civ. P. 56(c). Enablement is a question of law based on underlying factual findings. *In re Wands*, 858 F.2d 731, 735 (Fed. Cir. 1988). A party must prove invalidity based on non-enablement by clear and convincing evidence. *Microsoft Corp. v. i4i Ltd. P'ship*, 131 S. Ct. 2238, 2242 (2011); *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1238-39 (Fed. Cir. 2003). Thirty-five U.S.C. § 112 sets forth the enablement requirement:

[t]he specification shall contain a written description of the invention, and the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same.

35 U.S.C. § 112, ¶ 1. “To be enabling, the specification of a patent must teach those skilled in the art how to make and use the full scope of the claimed invention without ‘undue experimentation.’” *Genentech, Inc. v. Novo Nordisk, A/S*, 108 F.3d 1361, 1365 (Fed. Cir. 1997) (quoting *In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993)). The enablement determination proceeds as of the effective filing date of the patent. *Plant Genetic Sys., N.V. v. DeKalb Genetics Corp.*, 315 F.3d 1335, 1339 (Fed. Cir. 2003).

Enablement serves the dual function in the patent system of ensuring adequate disclosure of the claimed invention and of preventing claims broader than the disclosed invention. *See AK Steel*, 344 F.3d at 1244. This important doctrine prevents both inadequate disclosure of an invention and overbroad claiming that might otherwise attempt to cover more than was actually invented. Thus, a patentee chooses broad claim language at the peril of losing any claim that cannot be enabled across its

full scope of coverage. “The scope of the claims must be less than or equal to the scope of the enablement to ensure that the public knowledge is enriched by the patent specification to a degree at least commensurate with the scope of the claims.” *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed. Cir. 2008) (quoting *Nat’l Recovery Techs., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1195-96 (Fed. Cir. 1999)); *see also In re Fisher*, 427 F.2d 833, 839 (CCPA 1970) (“[T]he scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification to persons of ordinary skill in the art.”).

The asserted claims of the ’922 patent broadly claim any tri-layer tunnel junction device wherein “applying a small magnitude of electromagnetic energy to the junction ... causes a change in the resistance by at least 10% at room temperature.” ’922 patent at col. 8 ll. 50-54. The district court construed the limitation “a change in resistance of at least 10%” as:

a change in resistance of at least 10% using the formula  $\Delta R/R = (R_1 - R_2)/R_1$ , where  $\Delta R/R$  represents the percent change in resistance,  $R_1$  is the resistance of the junction **before** the application of electromagnetic energy reverses at least one of the magnetization directions, and  $R_2$  is the resistance of the junction **after** the application of electromagnetic energy and the resultant reversal of at least one of the magnetization directions.

*MagSil Corp. v. Seagate Tech.*, No. 1:08-CV-0940, slip op. at 2 (D. Del. Mar. 1, 2011). The district court further found that the asserted claims cover “resistance changes beyond 120% and up to infinity.” *MagSil Corp.*, 764 F. Supp. 2d at 680. Thus, the specification at the time of

filing must teach one of ordinary skill in the art to fully perform this method across that entire scope.

The record shows that MagSil advocated for a broad construction of this claim term. Its expert Dr. Murdock testified that this term covers tunnel junctions with resistive changes of 100% or more. Dr. Moodera, a named inventor, also testified that a 1000% change falls within the scope of the claims, despite that he had never made such a tunnel junction.

The specification—the disclosure available to show the full scope of enablement—teaches that the inventors’ best efforts achieved a maximum change in resistance of only 11.8% at room temperature. As the district court noted, MagSil has “not disclaimed the asserted claims’ infinite scope in the area of resistive change.” *Id.* at 679. Accordingly, this record and specification show that the district court correctly discerned that the asserted claims are not enabled. The ’922 patent application was filed in March 1995. Hitachi has shown with clear and convincing evidence that one skilled in the art could not have taken the disclosure in the specification regarding “change in the resistance by at least 10% at room temperature” and achieved a change in resistance in the full scope of that term without undue experimentation.

The specification must contain sufficient disclosure to enable an ordinarily skilled artisan to make and use the entire scope of the claimed invention at the time of filing. *Sitrick*, 516 F.3d at 1000. Here, the specification teaches that the fundamental science of the tunneling junction was known “for many years,” but past efforts did not produce effective use of the phenomenon. ’922 patent col. 2 ll. 3-8. The specification discloses a 1975 publication by Michel Julliere that predicted an ideal tunnel junction could yield around a 24% change in resistance. Yet, the



specification teaches that twenty years later, when the application was filed, the best achievement was an 11.8% change. Named inventor Dr. Meservey also testified that before the application was filed, he did not know how to achieve a tunnel junction with greater than 20% change in resistance.

During prosecution of the '922 patent, MagSil stated that it had achieved resistive changes of 18% at this time after the date of filing. During prosecution MagSil also predicted still higher resistive changes because no clear theoretical limit prevented achieving the highest possible value of 100%. The inventors' understanding during prosecution that a 100% resistive change was an upper limit is inconsistent with MagSil's position at the time of this case. During this litigation, MagSil's expert Dr. Murdock testified that a person of ordinary skill in the art could work from the '922 patent and make tunneling junctions with a resistive change between 100% and 120% without undue experimentation.

Dr. Murdock's aggressive view of the scope of this invention, however, runs counter to his own testimony that the first junction with this level of resistive change was not developed until 2006 or 2007. It also does not explain why it took some twelve years after the '922 patent application was filed to achieve these results. Dr. Murdock also testified that experimentation on electrode metals and tunnel barrier insulator materials, as well as on the processes to make them, was needed to achieve these results. He further acknowledged that even someone of extraordinary skill in the art in 1995 could not have predicted the exact process and materials needed for the 120% resistive change achieved over ten years later.

Even if Dr. Murdock's testimony could somehow overcome the requirement that the enabling disclosure must

appear in the specification at the time of filing, his assertions also fail to reach the modern dimensions of this field of invention. His testimony (suggesting a resistive change between 100% and 120%) only reaches a lower-end of the claimed scope. The invention claims resistive changes from at least 10% up to infinity. Dr. Murdock admitted that resistive change of 604% has now been achieved by others, and the claim scope extends well beyond that value as well. The '922 patent specification does not disclose working examples of tunnel junctions with resistive changes of 20%, 120%, 604%, or 1000%. The named inventors were not able to achieve even a 20% change a year after filing the application in 1995, and 604% junctions were not achieved until 2008.

In sum, this field of art has advanced vastly after the filing of the claimed invention. The specification containing these broad claims, however, does not contain sufficient disclosure to present even a remote possibility that an ordinarily skilled artisan could have achieved the modern dimensions of this art. Thus, the specification enabled a marginal advance over the prior art, but did not enable at the time of filing a tunnel junction of resistive changes reaching even up to 20%, let alone the more recent achievements above 600%.

The trial court's finding of an enablement deficiency falls squarely within this court's precedent. *See Fisher*, 427 F.2d 833. In *Fisher*, the patent application was directed to a system for production of substances containing adrenocorticotrophic hormone (ACTH) that were suitable for injection into humans for adrenal gland stimulation. 427 F.2d at 834. The claims recited a potency of "at least 1 International Unit of ACTH per milligram," and the specification disclosed that previous experiments yielded compounds with a maximum potency of 50% or 0.5 International Units ("IUs"). *Id.* The patent

application, however, only disclosed compounds with ACTH potencies of between 111% and 230%, or 1.11 and 2.3 IUs per milligram. *Id.* The issue presented was:

whether an inventor who is the first to achieve a potency of greater than 1.0 for certain types of compositions, which potency was long desired because of its beneficial effect on humans, should be allowed to dominate all such compositions having potencies greater than 1.0, including future compositions having potencies far in excess of those obtainable from his teachings plus ordinary skill.

*Id.* at 839. The claims were not patentable because the specification did not enable ACTH potencies much greater than 2.3 IUs, when “at least 1” was claimed. *Id.* at 839.

Here, the claim term “change in the resistance by at least 10%” is very similar to the “open-ended” term in *Fisher* because it has a lower threshold, but not an upper limit. The asserted claims of the ’922 patent cover resistive changes from 10% up to infinity, while the ’922 patent specification only discloses enough information to achieve an 11.8% resistive change. The specification discloses that artisans hoped to achieve values of around 24%, but had not done so. During prosecution MagSil believed that the highest possible resistive change was 100%. Yet, the claims covered changes far above 20% or 100% even when the inventors could not explain any way to achieve these levels. As MagSil’s expert Dr. Murdock testified, since 1995 when the specification was filed, resistive changes now stretch up to above 600%.

The open claim language chosen by the inventors does not grant them any forgiveness on the scope of required enablement. Open claim language, such as the word “comprising” as a transition from the preamble to the body of a claim, “signals that the entire claim is presump-

tively open-ended.” *Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1371 (Fed. Cir. 2005). “The transition ‘comprising’ creates a presumption that the recited elements are only a part of the device, that the claim does not exclude additional, unrecited elements.” *Crystal Semiconductor Corp. v. TriTech Microelectronics Int’l, Inc.*, 246 F.3d 1336, 1348 (Fed. Cir. 2001). MagSil seeks some easing of the enablement requirement by using this language in the asserted claims. To support its argument, MagSil refers to this court’s decision in *Gillette*.

In *Gillette*, the patentee claimed “[a] safety razor blade unit comprising ... a group of first, second, and third blades.” 405 F.3d at 1369. In that preliminary injunction case, this court noted that the claim used “the ‘open’ claim terms ‘comprising’ and ‘group of,’ in addition to other language, to encompass subject matter beyond a razor with only three blades.” *Id.* at 1371. This court looked to the claim language, specification, and prosecution history to find that the claim covered a razor with four blades. *Id.* at 1371-72. This court also noted that the open language of the claim “embraces technology that may add features to devices otherwise within the claim definition.” *Id.* at 1371.

MagSil contends that its open-ended threshold recitation of “at least 10%,” which when construed does not have an upper limit, is equivalent to *Gillette*’s open-language “comprising” recitation. Therefore, MagSil argues, if the “at least 10%” recitation is construed to not have an upper limit, then the “comprising” recitation as found in *Gillette* should also be construed to include every conceivable number of blades, up to infinity, which would not have been enabled. In the first place, enablement was not an issue in *Gillette*. Moreover, the safety razor technology and the very fact-specific distinctions in that case do not apply in this technology or case. In *Gillette*, for

example, the open claim language entailed more than the “comprising” term and the construction was aided by the specification and prosecution history. In fact, the issue concerned whether the claim language covered an embodiment with more than one blade labeled as a “second blade,” where the terms “first, second, and third” did not specify the number of blades but specific characteristics of blades in those categories. *Id.* at 1372-73. Thus, the *Gillette* invention did not claim an infinite number of blades but blades with three separate categories of characteristics. Therefore, this case’s claim limitation extending to an open-ended range of values, which must be present for infringement, is different from a preamble recitation “comprising,” which does not exclude additional features to devices otherwise within the narrower claim definition. *See id.*

The ’922 patent specification only enables an ordinarily skilled artisan to achieve a small subset of the claimed range. The record contains no showing that the knowledge of that artisan would permit, at the time of filing, achievement of the modern values above 600% without undue experimentation, indeed without the nearly twelve years of experimentation necessary to actually reach those values. The enablement doctrine’s prevention of over broad claims ensures that the patent system preserves necessary incentives for follow-on or improvement inventions. In this case, for instance, many additional inventions and advances were necessary to take this technology from a 20% resistance change to the over 600% change in present data storage systems. Moreover this technology area will continue to profit from inventive contributions. Enablement operates to ensure fulsome protection and thus “enable” these upcoming advances.

MagSil’s difficulty in enabling the asserted claims is a problem of its own making. *See Liebel-Flarsheim Co. v.*

*Medrad, Inc.*, 481 F.3d 1371, 1380 (Fed. Cir. 2007) (“The irony of this situation is that Liebel successfully pressed to have its claims include a jacketless system, but, having won that battle, it then had to show that such a claim was fully enabled, a challenge it could not meet.”) This court holds that the asserted claims are invalid for lack of enablement because their broad scope is not reasonably supported by the scope of enablement in the specification. *See Fisher*, 427 F.2d at 839. MagSil did not fully enable its broad claim scope. Therefore, it cannot claim an exclusive right to exclude later tri-layer tunnel junctions that greatly exceed a 10% resistive change. *Id.*

### III.

The district court entered summary judgment of non-infringement of the asserted claims after finding them invalid for lack of enablement. Hitachi’s disk drive products do not infringe the asserted claims because “[t]here can be no infringement of claims deemed to be invalid.” *Marrin v. Griffin*, 599 F.3d 1290, 1295 (Fed. Cir. 2010).

For the forgoing reasons, this court affirms the district court’s finding that claims 1-5, 23-26, and 28 of the ’922 patent are invalid for lack of enablement. Accordingly, this court also affirms the district court’s finding of non-infringement.

**AFFIRMED**