

United States District Court,
D. Delaware.

CFMT, INC. and CFM Technologies, Inc,
Plaintiffs.

v.

YIELDUP INTERNATIONAL CORP,
Defendant.

No. Civ.A. 98-790-RRM

April 4, 2000.

Owner of semiconductor wafer cleaning patents sued competitor for infringement. On defendant's motion for summary judgment, the District Court, McKelvie, J., held that patents were invalid for lack of enablement.

Motion granted.

4,911,761. Cited.

Josy W. Ingersoll, John W. Shaw, Young, Conaway, Stargatt & Taylor, LLP, Wilmington, DE, David C. Berry, Douglas J. Kline, Stephen D. Whetstone, Testa, Hurwitz & Thibault, LLP, Boston, MA, for plaintiffs.

Mary B. Graham, Morris, Nichols, Arsht & Tunnell, Wilmington, DE, Susan K. Knoll, L. Gene Spears, James C. Pistorino, Arnold, White & Durkee, Houston, TX, for defendant.

OPINION

McKELVIE, District Judge.

This is a patent case. Plaintiff CFMT, Inc. is a Delaware corporation with its principal place of business in Wilmington, Delaware. Plaintiff CFM Technologies, Inc. ("CFM") is a Pennsylvania corporation with its principal place of business in West Chester, Pennsylvania. CFMT, Inc. is the owner of U.S. Patent Nos. 4,778,532 (the '532 patent) and 4,917,123 (the '123 patent). CFM is the exclusive licensee under the patents. Prior to October 1999, defendant YieldUP International Corp. ("YieldUP") was a Delaware corporation with its principal place of business in Mountain View, California. In October 1999, YieldUP was acquired by FSI International, a Minnesota corporation with its principal place of business in Chaska, Minnesota.

On December 30, 1998, CFMT, Inc. and CFM (collectively, "CFMT") filed a complaint alleging that YieldUP infringes one or more claims of the '532 and '123 patents. YieldUP filed its answer and

counterclaim on January 25, 1999, in which it denied CFMT's allegation of infringement, asserted affirmative defenses of invalidity and unenforceability and sought a declaratory judgment of invalidity and non-infringement. The case is scheduled for a ten-day jury trial beginning May 1, 2000.

On December 22, 1999, YieldUP moved for a summary judgment that the '532 and '123 patents are invalid because the patents' specifications are non-enabling. On January 31, 2000, CFMT filed a cross-motion for a summary judgment that the patents are enabling. The parties have completed briefing on the motions. On March 15, 2000, the court heard oral argument on the motions and held a trial in accordance with *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996), to construe disputed claims of the '532 and '123 patents. This is the court's construction of those disputed claims and its decision on the motions for summary judgment.

I. FACTUAL AND PROCEDURAL BACKGROUND

The court draws the following facts from the affidavits, documents and deposition transcripts submitted by the parties.

A. General Description of the Technology

The patents in suit relate to technology for cleaning silicon wafers during computer chip manufacturing. A computer chip typically consists of a wafer of processed silicon, a surrounding case that protects the silicon, and wires that extend from the silicon and enable the chip to interact with the computer or other equipment in which it is used. Manufacturing computer chips requires more than 200 processing steps in which discs of silicon, called semiconductor wafers, are repeatedly etched and implanted with circuitry. Over 40 of these steps are wet processing steps where the wafers are subjected to process fluids.

Prior to the patents in suit, individual wet processing steps were performed by dipping semiconductor wafers into a series of open sinks, where each successive sink contained a different process fluid. Because the sinks were open to the atmosphere, however, unwanted airborne particles could enter the process fluids and contaminate the wafer's microscopic circuits. In subsequent processing steps when layers or coatings were added to the wafer, the contaminants could become trapped or "burned into" the wafer, resulting in a defective computer chip. During a previous trial concerning a related CFMT patent, one of the inventors of the patents in suit explained:

If there is even the tiniest speck of material in one of those lines, it is like a boulder on a railroad track. And if it tends to be conducting material then it shorts those railroad tracks together and you are going to end up with a dead device.

B. The '532 and '123 Patents

On October 18, 1988, the United States Patent and Trademark Office ("PTO") issued the '532 patent to CFM as assignee of the inventors, Christopher F. McConnell and Alan E. Walter. The '532 patent is entitled "Process and Apparatus for Treating Wafers with Process Fluids." On April 17, 1990, the PTO issued the '123 patent to CFM as assignee of the inventors, McConnell and Walter. The '123 patent is entitled "Apparatus for Treating Wafers with Process Fluids." The '532 and '123 patents were later assigned to CFMT, Inc. and CFM became the exclusive licensee of the patents.

The '532 and '123 patents describe the same technology. The '532 patent claims a method for practicing the

invention and the '123 patent claims an apparatus. The patents describe a "Full Flow" system for wet processing semiconductor wafers wherein process fluids (gases or liquids) are pumped into an enclosed vessel where the wafers remain stationary. The "Full Flow" system allows process fluids to flow past the wafers sequentially and continuously. The apparatus then drains the fluids out the bottom as new fluids come in the top for rinsing or drying.

By consolidating the cleaning, rinsing and drying steps used in wafer fabrication into a single, enclosed vessel with a continuous flow of process fluids past wafer surfaces, the inventions purport to offer several advantages over the prior art. First, because the system is enclosed, safety concerns about various chemicals used during processing are minimized. In addition, because the wafers do not move through the atmosphere from one process fluid to another, the likelihood of contamination by airborne particles is reduced.

The '532 and '123 patents were based on a prototype that McConnell and Walter started building in the summer of 1984. The two inventors designed and constructed the prototype in the basement of a house owned by McConnell's father-in-law. When McConnell and Walter finished the prototype in the spring of 1985, it covered most of the basement. The tool's design was later incorporated as Figure 1 of the '532 and '123 patent specifications.

C. Prosecution History of the '532 Patent

CFMT has asserted Claims 1, 3-5, 7, 20, 21, 36, 43, 44, 47 and 54-58 of the '532 patent against YieldUP. Of the claims asserted against YieldUP, Claims 1, 54, 55, 57 and 58 are independent claims.

1. Application of August 13, 1985

On August 13, 1985, inventors McConnell and Walter applied for a patent for a process and apparatus for treating wafers with process fluids. The original application for the '532 patent included claims for the apparatus that were later withdrawn and resubmitted in a separate application for the '123 patent. In the summary of the invention, the inventors described an enclosed, full-flow method wherein process fluids flow sequentially and continuously past the wafers. The inventors recommended their wet processing method for cleaning semiconductor wafers. The specification states that the "processes and apparatus of the present invention are especially useful in the prediffusion cleaning of wafers...."

In the original application, Claim 1 reads as follows:

1. An enclosed, full flow method for the cleaning of semiconductor wafers wherein process fluids flow sequentially and continuously past said wafers in a vessel, comprising the steps of

- (a) contacting said wafers with at least one cleaning fluid to remove contaminants from said wafers.
- (b) removing said cleaning fluid from said wafers with a rinsing fluid, and
- (c) removing said rinsing fluid from said wafers with a drying fluid;

whereby the processing does not require movement or operator handling of said wafers between said steps, and

wherein the vessel containing said wafers is hydraulically full during each process step.

Claim 55 is representative of the other independent claims of the '532 patent. In the original application, Claim 55 reads as follows:

55. An enclosed, full flow method for the treatment of semiconductor wafers wherein process fluids flow sequentially and continuously past said wafers in a vessel comprising reacting the surface of said wafers with at least one chemical reagent, whereby the processing does not require movement or handling of said wafers between said steps and wherein the vessel containing said wafers is hydraulically full during each process step.

2. Rejection of November 25, 1986

On November 25, 1986, the PTO rejected the claims in the application. The examiner stated that the claims were obvious under 35 U.S.C. s. 103 based on the prior art references of Aigo and Gluck. FN1 According to the examiner, Aigo suggests a flow process for cleaning semiconductor wafers by contacting the wafers with a cleaning fluid, removing the cleaning fluid with a rinsing fluid, and rinsing the wafers with a drying fluid. The examiner wrote that "[i]t would have been obvious to clean silicon wafers in view of the teachings of Aigo since the environment and process is similar to that of the instant invention."

FN1. 35 U.S.C. s. 103(a) provides:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, 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.

3. Amendment of April 13, 1987

On April 13, 1987, the inventors submitted an amendment to the PTO. The inventors suggested that the examiner had misinterpreted the Aigo patent because the etchant in Aigo is used not to clean the wafers, but to selectively remove portions of the surface layer of the wafer in order to form the semiconductor wiring circuit. Even if the etchant in Aigo is a cleaning fluid, the inventors wrote that Aigo does not teach or suggest the present invention because Aigo uses open tanks rather than an enclosed, full flow system. Specifically, the inventors wrote that Aigo does not teach or suggest:

1. An enclosed, full flow method for cleaning or otherwise treating the semi-conductor wafers;
2. Flowing process fluids sequentially and continuously past the wafers in a vessel;
3. Absence of movement or operator handling of wafers between process steps; or
4. A hydraulically full vessel containing the wafers during each process step.

The inventors also distinguished their invention from Gluck and other prior art references by arguing that the prior art does not teach an "enclosed full flow method wherein process fluids flow sequentially and continuously past the wafers in a vessel." The inventors requested that the examiner reconsider the application and withdraw his rejections based on the prior art references.

4. Rejection of July 10, 1987

On July 10, 1987, the PTO sent the inventors a final action letter rejecting all pending claims. In response to the inventors' argument that the etchant used in Aigo is not a cleaning fluid, the examiner wrote that the pending claims do not recite any process limitations that are substantially distinct from Aigo. "The instant claims broadly recite respectively, 'a cleaning fluid,' at least one cleaning fluid, at least one chemical reagent, all which can be construed as 'an etchant.' " In response to the inventors' argument that the prior art references teach an open tank method rather than the enclosed full flow method of the instant invention, the examiner stated that this limitation has "not been shown to produce new or unexpected results in the wafer cleaning art."

Following this rejection, on November 30, 1987, the examiner held a telephone interview with William W. Schwarze, counsel for the inventors. During the interview, Schwarze and the examiner discussed changes that the inventors could make to the application to overcome the examiner's rejection.

5. Amendment of December 10, 1987

On December 10, 1987, the inventors submitted a proposed amendment in response to the Final Rejection. The purpose of the proposed amendment was to restate certain claim language in the form of actual process steps to overcome the examiner's contentions that the claims did not recite any process limitations that were distinct from the prior art. The inventors stated that

the novel conditions or steps which are not shown or suggested by the prior art are closing the wafers to the environment, flowing process fluids past the wafers in sequential steps without requiring movement or operator handling of the wafers between steps, and maintaining the wafer vessel hydraulically full during each process step.

For a list of the advantages of the present invention over the prior art, the inventors directed the examiner to the specification. The inventors wrote, "[t]he net effect of all of the ... advantages is the reduction of the risk of introducing contaminants while simultaneously improving the yield of non-defective semiconductor devices."

Claim 1, as submitted in the proposed amendment, reads as follows, with the underlining and brackets indicating added and retracted language, respectively:

1. An enclosed, full flow method for the cleaning of semiconductor wafers [wherein] *comprising positioning said wafers in a vessel, closing said vessel to the environment, and flowing process fluids [flow] sequentially and continuously past said wafers in [a] said vessel, [comprising] including* the steps of

(a) contacting said wafers with at least one cleaning fluid to remove contaminants from said wafers.

(b) removing said cleaning fluid from said wafers with a rinsing fluid, and

(c) removing said rinsing fluid from said wafers with a drying fluid;

whereby the processing does not require movement or operator handling of said wafers between said steps, and

[wherein] *maintaining* the vessel containing said wafers [is] hydraulically full during each process step.

McConnell and Walter made similar changes to the other independent claims in the application. For example, Claim 54 was amended as follows:

55. An enclosed, full flow method for the treatment of semiconductor wafers [wherein] *comprising positioning said wafers in a vessel, closing said vessel to the environment, and flowing* process fluids [flow sequentially and] *in sequential steps* continuously past said wafers in [a] *said vessel [comprising] , including the step of* reacting the surface of said wafers with at least one chemical reagent, whereby the processing does not require movement or handling of said wafers between said steps and [wherein] *maintaining* the vessel containing said wafers [is] hydraulically full during each process step.

6. Notice of Allowability

On May 5, 1988, the PTO allowed the claims in the application, including the independent claims 1, 54, 55, 57 and 58. The examiner stated that the primary reason for the allowance was that none of the prior art references taught a closed, hydraulically full method for cleaning wafers using wash, rinse and drying cycles. As approved by the PTO, the '532 patent has 58 claims.

7. Comments on the Examiner's Reasons for Allowance

On June 24, 1988, the inventors sent the PTO a letter, suggesting that the examiner's Statement of Reasons for Allowance was unduly narrow in referring to the scope of the claims. The inventors stated that "while independent Claim 1 is directed to a closed, hydraulically full method for cleaning wafers using wash, rinse and drying steps, the other independent claims (55, 56, 58 and 59) do not necessarily require all of these features." The inventors requested that their comments be placed in the patent file.

D. Prosecution History of the '123 Patent

CFMT has also asserted Claims 1, 4, 5 and 19-23 of the '123 patent against YieldUP. Of the claims asserted against YieldUP, Claims 1, 19, 20, 22 and 23 are independent claims.

1. Application and Amendment of October 3, 1988

On October 3, 1988, McConnell and Walter applied for a patent for an apparatus for treating wafers with process fluids. As noted above, originally, the claims in this application were included together with the process claims in the application for the '532 patent. At the examiner's suggestion, however, the apparatus claims were withdrawn and resubmitted as a separate application. As a result, the original application for the '123 patent is identical to the application for the '532 patent. In order to eliminate the references to the method claims being considered separately, the inventors filed a preliminary amendment concurrently with their application for the '123 patent. Because the application for the '123 patent was filed as a division of the application for the '532 patent, the patents share a common written description.

In the application for the '123 patent, as amended, Claim 1 reads as follows:

1. Apparatus for wet processing of semiconductor wafers comprising:

(a) vessel means for supporting said wafer in a closed circulation process stream wherein process fluids may sequentially flow past said wafer;

(b) means for supplying at least one cleaning fluid to said process stream for removing contaminants from said wafers, and means for withdrawing said cleaning fluid from said process stream;

(c) means for supplying a rinsing fluid to said process stream for removing other fluids from said wafers, and means for withdrawing said rinsing fluid from said process stream; and

(d) means for supplying a drying fluid to said process stream for removing other fluids from said wafers and means for withdrawing said drying fluid from said process stream.

Claim 20 is representative of the other independent claims of the '123 patent. In the application, as amended, Claim 20 reads:

20. Apparatus for wet processing of semiconductor wafers comprising:

(a) vessel means for supporting said wafers in a closed circulation process stream wherein process fluids may sequentially flow past said wafers and

(b) means for supplying at least one chemical reagent to said process stream for reacting with portions of said wafers, said process stream being positioned within said vessel means such that said vessel means is hydraulically full with process fluid.

2. Rejection of December 30, 1988

On December 30, 1988, the PTO rejected the claims in the application for the '123 patent. The examiner stated that the claims were obvious under 35 U.S.C. s. 103 based on prior art references, including Edwards and Ham.

3. Amendment of April 4, 1989

On April 4, 1989, McConnell and Walter submitted an amendment to the PTO. The inventors amended some of the independent claims to more particularly point out and distinctly claim the invention. The inventors stated that "[t]he amendments ... point out that the vessel is hydraulically full when the process fluids flow past the wafers and that means are provided for minimizing the gas/liquid interfaces of the rinsing fluid."

In the amendment, the inventors distinguished their invention from Edwards, Ham and other prior art references cited by the examiner. "There is no teaching, suggestion or disclosure in either Edwards or Ham to provide Edwards with means for supplying/withdrawing a drying fluid." In addition, the inventors argued that Edwards does not disclose a vessel that is hydraulically full during each process step. Finally, the inventors stated that their invention includes a means for minimizing the gas/liquid interfaces of the rinsing fluid that is not disclosed in the prior art.

Claim 1, as submitted in the proposed amendment, reads as follows, with the underlining and brackets indicating added and retracted language, respectively:

1. Apparatus for wet processing of semiconductor wafers comprising:

(a) vessel means for supporting said [wafer] *wafers* in a closed circulation process stream wherein process fluids may sequentially flow past said wafers, *said vessel being hydraulically full with process fluid when said process fluids flow past said wafers*;

(b) means for supplying at least one cleaning fluid to said process stream for removing contaminants from said wafers, and means for withdrawing said cleaning fluid from said process stream;

(c) means for supplying a rinsing fluid to said process stream for removing other fluids from said wafers, *means for minimizing gas/liquid interfaces is said rinsing fluid* and means for withdrawing said rinsing fluid from said process stream; and

(d) means for supplying a drying fluid to said process stream for removing other fluids from said wafers and means for withdrawing said drying fluids from said process stream.

In the amendment McConnell and Walter also added the phrase, "means for minimizing gas/liquid interfaces in said rinsing fluid," to Claims 22 and 23, two of the other independent claims in the application.

4. Rejection of July 19, 1989

On July 19, 1989, the PTO rejected the claims in the application for the '123 patent. The examiner stated that the claims were indefinite under 35 U.S.C. s. 112. FN2 According to the examiner, "the phrase 'hydraulically full' is confusing in that it is not exactly clear as to what the vessel should be hydraulically full of." In addition, the examiner wrote that it not clear how the "process fluids are 'withdrawn from the process stream' since the stream is itself the fluids." The examiner wrote that the claims would be allowable if rewritten or amended to overcome the rejection.

FN2. 35 U.S.C. s. 112 provides, in pertinent part:

The specification shall contain a written description of the invention, and of 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, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Amendment of October 23, 1989

On October 23, 1989, the inventors submitted an amendment to the PTO in response to the examiner's rejection. According to the inventors, the independent claims in the application, Claims 1, 19, 20, 22 and 23, were amended to particularly point out that the vessel is hydraulically full with process fluid. Regarding the use of the phrase "withdrawn from the process stream," the inventors argued that the language is adequately supported and disclosed in the specification. The inventors stated that "the process stream is a succession of process fluids, each one being replaced by the succeeding process fluid."

6. Notice of Allowability

On November 6, 1989, the PTO allowed the claims in the application as amended. The examiner did not

provide a Statement of Reasons for Allowance. As approved by the PTO, the '123 patent has 24 claims.

E. Testing the Invention

In 1986, CFMT began marketing the Full Flow system. CFMT often referred to the system's drying method as one of its strengths. For instance, one CFMT brochure lists the lack of "particle generation," the lack of "streaking or staining," and "very fast drying" as benefits of the Full Flow system. The brochure claims that the wafers "emerge bone-dry from the drying step and have exceptionally low particle counts."

In late 1986, CFMT reached an agreement with Texas Instruments to test a second prototype or "beta tool" that the inventors had constructed based on the '532 and '123 patents. The agreement required CFMT to ship the Full Flow vessel to Texas Instruments before receiving payment. McConnell and Walter took turns visiting the Texas Instruments' facility in Sherman, Texas to help set up the system and take part in the testing.

The first wafers processed with the Full Flow system appeared clean to the naked eye. After looking at the wafers with a sophisticated laser scanning device, however, McConnell and Walter saw that the wafers had thousands of particle defects. At a previous trial concerning a related patent, McConnell testified that the wafers processed in the Full Flow system at Texas Instruments looked "terrible."

We could not believe our eyes. We were devastated. They actually looked a little bit like the wafers that we had way back in 1984, where you had those streaks and spots, except this time instead of being able to see the streaks and spots by looking at it this way, you could-the particle-it was as if they were shadows of it and the particle detector had decorated and highlighted sort of like hidden marks and streaks and spots and you could just see all of this, I don't know, stuff on the wafers. And we could not believe it.

Walter was also surprised by how "filthy" the wafers looked. He testified that "when we shipped the machine, we honestly thought we had the best thing since sliced bread and here, you get the wafers out and we discover, oh, my God, look. There are thousands and thousands of particles on the wafers."

After they observed the "filthy" wafers under the scanning device, McConnell and Walter set out to find the source of the problem. According to McConnell, Texas Instruments initially assumed that the contamination was a facility-related issue.

TI was very good about it. They really felt as though it wasn't our problem, that it must be some sort of facility related issue.... But then as more days went on, they began becoming a little less sure that it was a TI problem and they began saying things like can we talk about how you built this machine?

McConnell and Walter flushed the entire system with ultra-pure water for several days. This cleansing procedure decreased particle count but it did not eliminate the problem. In April 1987, the inventors realized that the problem lay in the design of the invention.

In the next four months, the inventors worked "day in and day out" to solve the problem with the Full Flow system. They ran "hundreds and hundreds" of experiments and made numerous modifications to the prototype. According to McConnell:

[W]e launched a very intensive effort. It was sort of a no holds barred. We are going to do everything we

can think of. Everybody was focused on it. Alan [Walter] was doing as many experiments as he could down in Texas. I was back up in Lionville doing parallel work. We constructed a clear vessel that, as best we could, mocked the entire system with the exact same valves on the top. We looked at different approaches to drying. We theorized on what could be causing the problem....

Walter testified that by the summer of 1987 they had the problem "licked" and were "getting good results." By slowing the rate of descent, and controlling vapor pressure and water temperature, the inventors were able to eliminate condensation on the wafers. On April 20, 1998, McConnell and Walter applied for a patent on this process as a continuation in part of the application for the '532 patent.

F. *The '761 Patent*

On March 27, 1990, the PTO issued the '761 patent to CFM as assignee of McConnell and Walter. The '761 patent is entitled "Process and Apparatus for Drying Surfaces." The patent describes a method for introducing a drying vapor such as isopropyl alcohol in such a manner as to directly displace the rinsing fluid on the surface of the wafer. The drying process is said to be an "improvement which may be substituted for the steam or chemical drying systems" of the '532 patent.

G. *The Three Lawsuits*

1. *CFMT Sues YieldUP for Infringement of the '761 Patent*

On September 11, 1995, CFMT filed a complaint in this court alleging that YieldUP was infringing one or more claims of the '761 patent, either literally or under the doctrine of equivalents. At the time of the suit, CFMT did not assert that YieldUP was infringing the '532 and '123 patents. YieldUP filed its answer and counterclaim on November 9, 1995, in which it denied CFMT's allegation of infringement of the '761 patent, asserted affirmative defenses of invalidity and unenforceability and sought a declaratory judgment of invalidity and non-infringement.

On February 14, 1997, YieldUP moved for a summary judgment that its accused products did not infringe the '761 patent. On October 14, 1997, the court granted YieldUP's motion for summary judgment. However, on June 30, 1998, the court granted CFMT's motion for reargument and allowed the parties to submit supplemental briefs on YieldUP's motion for summary judgment. This case, Civil Action No. 95-549-RRM, is pending.

2. *CFMT Sues Steag for Infringement of the '761 Patent*

On July 10, 1995, CFMT filed a separate complaint alleging that Steag Microtech, Inc. was infringing one or more claims of the '761 patent. CFMT did not assert that Steag was infringing the '532 and '123 patents. The case proceeded to trial on issues of infringement, invalidity and enforceability. It was during this trial that McConnell and Walter testified about the problems they encountered when the Full Flow system was initially tested at Texas Instruments. On December 12, 1997, the jury returned a verdict in which it determined that operation of Steag's drying process literally infringes Claims 1, 8, 17 and 22 of the '761 patent. The jury awarded CFMT damages of \$3,105,000.

Steag moved for judgment as a matter of law ("JMOL") on numerous issues, including infringement. On June 18, 1998, this court denied Steag's motions on all issues except that of infringement under the doctrine of equivalents. *CFMT, Inc. v. Steag Microtech, Inc.*, 14 F.Supp.2d 572 (D.Del.1998). On that date the court

also enjoined Steag from making, using, or selling any such devices that infringe the '761 patent.

Steag appealed the denial of JMOL for no literal infringement. On May 13, 1999, the U.S. Court of Appeals for the Federal Circuit issued a decision affirming the ruling of this court in all respects except one. *CFMT, Inc. v. Steag Microtech, Inc.*, 194 F.3d 1336 (Fed.Cir.1999). The appeals court questioned whether one claim limitation of the '761 patent reads upon Steag's method. The appeals court vacated this court's judgment in part, and remanded the case for reconsideration of the issue of literal infringement of the claim in question.

On June 30, 1999, Steag filed a motion for JMOL that Steag's drying process does not literally infringe the '761 patent. CFMT responded with a motion to reinstate the court's judgment of June 18, 1998. On November 8, 1999, this court denied Steag's motion for JMOL on the issue of literal infringement and granted CFMT's motion to reinstate the June 18, 1998 judgment. *CFMT, Inc. v. Steag Microtech, Inc.*, 71 F.Supp.2d 373 (D.Del.1999). Steag appealed the denial of the JMOL for no literal infringement and that appeal is pending.

3. CFMT Sues YieldUP for Infringement of the '532 and '123 Patents

On December 30, 1998, CFMT filed a second complaint against YieldUP, alleging that YieldUP infringes one or more claims of the '532 and '123 patents. YieldUP filed its answer and counterclaim on January 25, 1999 in which it denied CFMT's allegation of infringement, asserted affirmative defenses of invalidity and unenforceability and sought a declaratory judgment of invalidity and non-infringement.

On December 22, 1999, YieldUP filed a motion for a summary judgment that the '532 and '123 patents are invalid because the patents' specifications are non-enabling. In support of its motion, YieldUP cites McConnell and Walter's own testimony during the *Steag* trial, in which they described the wafers that emerged from the Full Flow system as "filthy" and "terrible." YieldUP contends that McConnell and Walter admitted that it took them six months of experimentation to solve the problem with the Full Flow system.

On January 31, 2000, CFMT filed a cross-motion for a summary judgment that the '532 and '123 patents are enabling. CFMT contends that there is no genuine dispute that the Full Flow system met the specifications '532 and '123 patents. In addition, CFMT argues that the inventors' testimony during the *Steag* trial is irrelevant to the enablement analysis of the '532 and '123 patents.

II. DISCUSSION

A. Claim Construction

1. Basic Principles of Claim Construction

[1] [2] [3] [4] [5] Claim construction is a matter for the court. *Markman*, 52 F.3d at 979. Claims are construed from the vantage point of a person of ordinary skill in the art at the time of the invention. *Id.* at 986. In construing a claim, a court looks first to the intrinsic evidence of record, namely, the claims, the written description and the prosecution history. *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1309 (Fed.Cir.1999). The claim language itself defines the scope of the claim, and "a construing court does not accord the specification, prosecution history and other relevant evidence the same weight as the claims

themselves, but consults these sources to give the necessary context to the claim language." *Eastman Kodak v. Goodyear Tire & Rubber Co.*, 114 F.3d 1547, 1552 (Fed.Cir.1997). Extrinsic evidence may be consulted to ensure that the claim construction being considered by the court "is not inconsistent with the clearly expressed, plainly apposite, and widely held understandings in the pertinent technical filed." *Pitney Bowes*, 182 F.3d at 1309.

[6] Although the Federal Circuit has held that claims should be read in view of the specification, *see, e.g., id.*, the court has repeatedly cautioned against limiting the scope of a claim to the preferred embodiment or specific examples disclosed in the specification. *See, e.g., Ekchian v. Home Depot, Inc.*, 104 F.3d 1299, 1303 (Fed.Cir.1997); *Intervet America, Inc. v. Kee-Vet Laboratories, Inc.*, 887 F.2d 1050, 1053 (Fed.Cir., 1989) ("[L]imitations appearing in the specification will not be read into claims, and ... interpreting what is meant by a word in a claim 'is not to be confused with adding an extraneous limitation appearing in the specification, which is improper.' ") (citation omitted).

2. Claim Construction for the '532 Patent

a. " an enclosed, "flow method" for the "cleaning" or "treatment" of semiconductor wafers"

The preambles of Claims 1 and 57 of the '532 patent recite "an enclosed, full flow method for the cleaning of semiconductor wafers." Similarly, the preambles of the other independent claims of the '532 patent, Claims 54, 55 and 58, recite "an enclosed, full flow method for the treatment of semiconductor wafers." YieldUP proposes that these preambles should be interpreted as claim limitations because the inventors relied upon the language in the preambles to distinguish their invention from the prior art.

CFMT, on the other hand, contends that the preambles add nothing to the meaning of the claims, and should be disregarded. According to CFMT, the language in the preambles does not inform the construction of the remainder of the claims and the inventors never relied upon that language as an independent inventive concept during the prosecution of the '532 patent.

[7] Claim preambles may be interpreted as claim limitations when they are " 'necessary to give life, meaning, and vitality' to the claim." *Pitney Bowes*, 182 F.3d at 1306 (quoting *Kropa v. Robie*, 38 C.C.P.A. 858, 187 F.2d 150 (Cust. & Pat.App.1951)). Such treatment is proper when preamble statements are "intimately meshed with the ensuing language of the claim." *Id.* Preambles should not be construed as claim limitations, however, when the body of the claims fully sets forth the complete invention, and the preamble offers no distinct definition of any of the claim limitations. *Id.* at 1305.

[8] In the '532 patent, the preamble language reciting an "enclosed, full flow method" for "cleaning" or "treatment" of semiconductor wafers is immediately followed by claim language that recites the step of "positioning said wafers in a vessel." By referring to "said wafers" the claims expressly incorporate the preamble language. *See Bell Communications Research, Inc. v. Vitalink Communications Corp.*, 55 F.3d 615, 621 (Fed.Cir.1995) (finding that the claimed method, by referring to "said packet," expressly incorporated by reference the preamble language describing the packets).

In addition, McConnell and Walter used the preamble language reciting an "enclosed, full flow method" for "cleaning" or "treatment" of semiconductor wafers to distinguish their invention from the prior art. For example, in their April 13, 1987 amendment to the application, McConnell and Walter stated that Aigo, Gluck and other prior art references do not teach or suggest "an enclosed, full flow method for cleaning or otherwise treating the semiconductor wafers."

Based on the references in the claims to the preamble language and the inventors' reliance on this language during the prosecution of the '532 patent, the court finds that the preambles are "necessary to give life, meaning, and vitality" to the claim. *Kropa*, 187 F.2d at 152. Therefore, the court will construe the preambles and the remainder of the claims as "one unified and internally consistent recitation of the claimed invention." *Pitney Bowes*, 182 F.3d at 1306.

i. " *enclosed* "

[9] The term "enclosed" appears in the preamble of each of the asserted independent claims. CFMT argues that the term refers to an apparatus that substantially prevents unwanted contaminants or substances from entering the apparatus from the outside environment. YieldUP, on the other hand, argues that "enclosed" means not open to what surrounds it. YieldUP bases its construction on the dictionary definition of "enclosed."

In the specification of the '532 patent, the inventors explain the importance of using an enclosed vessel to practice the invention.

In addition to the wafer vessel and the wafer carriers disclosed in the above-identified copending application, enclosed wafer vessels of other designs may be used. However, it is important for the processes of the present invention that the wafer vessel be closed. That is, the wafer vessel should not be open to the ambient atmosphere except when it is opened to load or unload wafers.

The evidence does not suggest, as CFMT argues, that "enclosed" refers to a process that "substantially" prevents contaminants from entering from the atmosphere. Therefore, the court finds, as advocated by YieldUP, that the term "enclosed" means not open to the ambient atmosphere.

ii. " *full flow* "

[10] The term "full flow" also appears in the preamble of each of the asserted independent claims. CFMT argues that the term refers to the inventors' short hand name for a process that includes the characteristics of flowing process fluids past wafers in a process vessel that is hydraulically full. YieldUP counters that the term "full flow" is a CFMT trademark that is not explicitly defined in any part of the patent documents. If the court construes the term, YieldUP contends that it means requiring turbulent plug flow with a high volume turnover rate.

The court does not find that the term "full flow" is an undefined trademark used by CFMT strictly for its marketing purposes. YieldUP markets its own products as "full flow processors" and YieldUP's co-founder and Chief Technology Officer, SurajPuri, has filed a patent application covering a "Full Flow Method and Apparatus for Cleaning Objects Using Dilute Ammonium Solutions." Therefore, the court finds that the term "full flow" would be understood by one of ordinary skill in the art.

The specification of the '532 patent does not suggest that "full flow" means "plug flow" as YieldUP argues. On the contrary, the two references to "plug flow" in the specification of the '532 patent suggest that if the inventors had meant to refer to "plug flow" in the patent claims, they knew how to do so, and they would not have used the term "full flow" instead. As advocated by CFMT, the court finds that the term "full flow" is a short-hand name for the method of flowing process fluids past wafers in a vessel that is hydraulically full.

iii. " *cleaning of semiconductor wafers* "

[11] The phrase "cleaning of semiconductor wafers" appears in the preamble of Claims 1 and 57 of the '532 patent. The parties agree, as does the court, that "cleaning of semiconductor wafers" refers to the removal of contaminants from the surface of the wafers.

iv. " *treatment of semiconductor wafers* "

[12] The phrase "treatment of semiconductor wafers," appears in the preamble of Claims 54, 55 and 58. CFMT asserts that the phrase "treatment of semiconductor wafers" means all aspects of wafer processing, including but not limited to cleaning. Apparently, YieldUP agrees with CFMT's construction of the phrase because YieldUP requests an instruction that "treatment of semiconductor wafers" includes cleaning. Therefore, the court finds that the phrase "treatment of semiconductor wafers" refers to all aspects of wafer processing, including cleaning.

b. " *closing said vessel to the environment* "

[13] The phrase "closing said vessel to the environment" appears in Claims 1, 54, 55, 57 and 58. Consistent with the earlier construction of the term "enclosed," the court finds that the phrase "closing said vessel to the environment" refers to a vessel that is not open to the ambient atmosphere.

c. " *flowing process fluids sequentially and continuously* "

[14] The phrase "flowing process fluids sequentially and continuously" appears in Claim 1 of the '532 patent. The related phrase, "flowing process fluids in sequential steps continuously past said wafers," appears in Claims 54, 55, 57 and 58. CFMT asserts that "flowing process fluids sequentially and continuously" means that process fluids flow past the wafers one after another and contact the wafers in a uniform, spatially uninterrupted manner. YieldUP counters that the term "continuously" requires an uninterrupted flow of process fluids. According to YieldUP, CFMT's construction of the phrase would cover a process where the wafers are dipped in fluids that are stagnant as opposed to flowing.

In the prosecution of the '532 patent, McConnell and Walter asserted that their "full flow" invention differed from the open sink methods used in the prior art because in their invention, "fluids flow sequentially and continuously past the wafers." In the open sink method used in the prior art, wafers are immersed in a sink containing a fluid and then moved to a second sink containing a second fluid. Therefore, the court's construction of the phrase "flowing process fluids sequentially and continuously" should not cover a process where the wafers are dipped in fluids that are stagnant as opposed to flowing. As advocated by YieldUP, the court finds that the phrase "flowing process fluids sequentially and continuously" means that process fluids flow past the wafers one after another and that the term "continuously" requires an uninterrupted flow of the process fluids.

d. " *hydraulically full* "

[15] The term "hydraulically full" appears in Claims 1, 55, 57 and 58 of the '532 patent. CFMT asserts that the term means that the process vessel becomes completely filled with one or more process fluids. YieldUP, on the other hand, asserts that the term "hydraulically full" requires that the vessel lack voids, dead ends, blind spots, or other surface irregularities within the vessel.

The specification of the '532 patent states that "hydraulically full" means that the wafer vessel becomes completely filled with process fluids. The specification goes on to say that "the vessel should not have blind spots, dead-ends, interior surface irregularities or the like where a process fluid or ambient atmosphere could be trapped." In the prosecution of the '123 patent, which also contains the term "hydraulically full," McConnell and Walter clarified the ambiguity.

As pointed out in the specification ... it is important that the design of the wafer vessel permits it to become hydraulically full of fluid during the processes of the present invention. Thus the vessel should not have blind spots, dead ends, interior surface irregularities or the like, where a process fluid or ambient atmosphere could be trapped.

The inventors relied on this definition of hydraulically full to distinguish their invention from the prior art. Therefore, the court finds, as advocated by YieldUP, that "hydraulically full" means completely filled with process fluid such that there are no blind spots, dead-ends, interior surface irregularities or the like where a process fluid or ambient atmosphere could be trapped.

e. " whereby the processing does not require[] movement or operator handling of said wafers between said steps "

[16] The phrase "whereby the processing does not require[] movement or operator handling of said wafers between said steps" appears in Claim 1 of the '532 patent. An almost identical phrase appears in Claims 54, 55, 57 and 58. CFMT asserts that this phrase precludes movement of the wafers between steps of the claimed process. According to CFMT, however, the phrase does not preclude all movement of wafers. YieldUP counters that the phrase excludes any cleaning process in which wafers are moved between vessels between steps of the process.

The specification of the '532 patent states that the invention does not require "handling by a human or robotic operator of the wafers between the steps of a multi-step fluid process such as prediffusion cleaning." During the prosecution of the '532 patent, the inventors distinguished their invention from the prior art because each step in the invention is carried out in a single vessel. For example, to overcome the examiner's rejection based on the Aigo and Gluck references, McConnell and Walter stated that "the wafers are apparently still moved from step to step in the wafer boat...." Therefore, the court finds, as advocated by YieldUP, that the phrase "whereby the processing does not require[] movement or operator handling of said wafers between said steps" excludes any cleaning process in which wafers are moved between vessels between steps of the process.

3. Claim Construction for the '123 Patent

[17] The '123 patent is a divisional of the '532 patent and, therefore, the patents share a common written description. The court will construe identical terms in the patents to have the same meaning. *Abtox, Inc. v. Exitron Corp.*, 131 F.3d 1009, 1010 (Fed.Cir.1997). Portions of the claims in the '123 patent are written using the means-plus-function terminology of 35 U.S.C. s. 112, para. 6. FN3 The court will construe these claims "to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." *Odetics, Inc. v. Storage Tech. Corp.*, 185 F.3d 1259, 1266-67 (Fed.Cir.1999).

FN3. 35 U.S.C. s. 112, para. 6 provides:

An element in a claim for a combination may be expressed as a means or step for performing a specified

function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

a. " *Apparatus for wet processing of semiconductor wafers* "

[18] The phrase "Apparatus for wet processing of semiconductor wafers" appears in the preamble to Claims 1, 19, 20, 22 and 23 of the '123 patent. The parties dispute whether this preamble language states a claim limitation.

In the '123 patent, the preamble language reciting an "Apparatus for wet processing of semiconductor wafers" is immediately followed by claim language that requires a "vessel means for supporting said wafers." By referring to "said wafers" the claims expressly incorporate the preamble language. *Bell*, 55 F.3d at 621. In addition, the specification of the '123 patent states that the invention is designed for "wet processing" of semiconductor wafers and that the invention is "especially useful in the prediffusion cleaning of wafers."

Based on the references in the claims to the preamble language and the reliance on this language in the specification, the court finds that the preambles are "necessary to give life, meaning, and vitality" to the claims. *Kropa*, 187 F.2d at 152. As advocated by YieldUP, the court finds that the term "wet processing" includes cleaning because the specification identifies cleaning as the "wet processing" for which the invention is "especially useful."

b. " *vessel means for supporting said wafers* "

[19] The phrase "vessel means for supporting said wafers" appears in Claims 1, 19, 20, 22 and 23 of the '123 patent. CFMT asserts that the phrase refers to a structure designed to hold wafers being processed and provide for a closed circulation process stream, and any structure that would be considered an equivalent. YieldUP counters that the phrase limits the claimed apparatus to one that has a sealed, flow-through vessel in which some structure is provided (such as grooves or slots) for supporting individual wafers.

The phrase at issue is written using the means-plus-function terminology of 35 U.S.C. s. 112 and, therefore, the court will construe the phrase to cover the corresponding structure and equivalents thereof. *See Odetics*, 185 F.3d at 1266-67. Figure 1 of the '123 patent illustrates one such "vessel means for supporting said wafers." The specification of the '123 patent also incorporates by reference the disclosures in three other patents and notes that those patents describe "suitable wafer vessels of other designs." The '123 patent and the patents incorporated by reference disclose a variety of other structures for positioning or supporting wafers in a vessel. As a result, the court finds that the phrase "vessel means for supporting said wafers" refers to a structure designed to hold wafers being processed and provide for a closed circulation process stream, and any structure that would be considered an equivalent.

c. " *in a closed circulation process stream* "

[20] The phrase "in a closed circulation process stream" appears in Claims 1, 19, 20, 22 and 23 of the '123 patent, CFMT asserts that the phrase refers to the flow of process fluids in a closed manner into a vessel from a source, or inlet, and out of a vessel through a drain, or outlet. CFMT argues that the term

"circulation" does not require that fluids travel in a complete loop or circle, or that they re-circulate. YieldUP, on the other hand, contends that the phrase "in a closed circulation process stream" requires that the process fluids move in a circle.

The language of the independent claims in the '123 patent does not require movement of fluid in a circle. The '123 patent, however, includes dependent claims, such as Claims 2 and 11, that require "recirculation" or "recycling" of process fluids. The broader independent claims cannot properly be construed to include the limitation of re-use or recirculation of process fluids, when those additional limitations are set forth in dependent claims. *See* United States v. Teletronics, 857 F.2d 778, 783 (Fed.Cir.1988) (holding that construction of a claim that renders another dependent claim superfluous is presumptively unreasonable). As advocated by CFMT, the court finds that the phrase "in a closed circulation process stream" refers to the flow of process fluids in a closed manner into a vessel from a source, or inlet, and out of a vessel through a drain, or outlet, but the phrase does not require that fluids travel in a complete loop or circle, or that they re-circulate.

d. " *hydraulically full* "

The term "hydraulically full" appears in Claims 1, 19, 20, 22 and 23 of the '123 patent. For the reasons set forth by the court in the discussion of the '532 patent, the court finds that the term "hydraulically full" means completely filled with process fluid such that there are no blind spots, dead-ends, interior surface irregularities or the like where a process fluid or ambient atmosphere could be trapped.

e. " *means for supplying at least one cleaning fluid to said process stream* "

[21] The phrase "means for supplying at least one cleaning fluid to said process stream" appears in Claims 1 and 19 of the '123 patent. The parties agree that the phrase is written in the means-plus-function terminology of 35 U.S.C. s. 112 and that Figure 1 of the '123 patent illustrates a structure with the "means for supplying at least one cleaning fluid to said process stream." As a result, the court finds that the phrase "means for supplying at least one cleaning fluid to said process stream" states a means-plus-function limitation that covers the corresponding structure in Figure 1 of the '123 patent and any equivalents thereof. *See* Odetics, 185 F.3d at 1266-67.

f. " *means for supplying a rinsing fluid to said process stream* "

[22] The phrase "means for supplying a rinsing fluid to said process stream" appears in Claims 1, 21, 22 and 23 of the '123 patent. The parties agree that the phrase is written in the means-plus-function terminology of 35 U.S.C. s. 112 and that Figure 1 of the '123 patent illustrates a structure with the "means for supplying a rinsing fluid to said process stream." As a result, the court finds that the phrase "means for supplying a rinsing fluid to said process stream" states a means-plus-function limitation that covers the corresponding structure in Figure 1 of the '123 patent and any equivalents thereof. *See* Odetics, 185 F.3d at 1266-67.

g. " *means for supplying a drying fluid to said process stream* "

The phrase "means for supplying a drying fluid to said process stream" appears in Claims 1 and 22 of the '123 patent. The parties agree that the phrase is written in the means-plus-function terminology of 35 U.S.C. s. 112 and that Figure 1 of the '123 patent illustrates a structure with the "means for supplying a drying fluid to said process stream." As a result, the court finds that the phrase "means for supplying a drying fluid to said process stream" states a means-plus-function limitation that covers the corresponding structure in

Figure 1 of the '123 patent and any equivalents thereof. *Odetics*, 185 F.3d at 1266-67.

B. Motion for Summary Judgment

1. Legal Standard for Summary Judgment

Summary judgment is appropriate when the "pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law." Fed.R.Civ.P. 56.

[T]he plain language of Rule 56(c) mandates the entry of summary judgment, after adequate time for discovery and upon motion, against a party who fails to make a showing sufficient to establish the existence of an element essential to that party's case, and on which that party will bear the burden of proof at trial.

Celotex v. Catrett, 477 U.S. 317, 322, 106 S.Ct. 2548, 91 L.Ed.2d 265 (1986). The moving party bears the initial burden of demonstrating the absence of material issues of fact. *Id.* at 323, 106 S.Ct. 2548. When deciding a motion for summary judgment, the court views the facts, and all permissible inferences from those facts, in the light most favorable to the non-moving party. *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 587-88, 106 S.Ct. 1348, 89 L.Ed.2d 538 (1986). Where the record could not lead a reasonable jury to find for the non-moving party, disposition by summary judgment is appropriate. *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248-49, 106 S.Ct. 2505, 91 L.Ed.2d 202 (1986).

2. Enablement

In support of its motion for summary judgment for non-enablement, YieldUP cites the testimony of CFMT's own inventors during the *Steag* trial, in which they described the wafers that emerged from the Full Flow system as "filthy" and "terrible." YieldUP contends that the enablement provision of 35 U.S.C. s. 112 required CFMT's inventors to describe an apparatus and method that could clean semiconductor wafers, or could be made to do so without undue experimentation. YieldUP asserts that the testimony of CFMT's inventors during the *Steag* trial proved that the Full Flow method could not clean wafers, and could not be made to do so without six months of extensive experimentation that led to the issuance of the '761 patent.

CFMT filed a cross-motion for a summary judgment that the '532 and '123 patents are enabling. Because McConnell and Walter were able to build prototypes that met the patent specifications and carried out the claimed inventions, CFMT contends that the '532 and '123 patents are enabling as a matter of law. In addition, CFMT argues that the inventors' testimony during the *Steag* trial about the cleanliness of the processed wafers is irrelevant to the enablement analysis because the the claims of the patents are not limited to achieving any level of cleanliness.

[23] Every patent is presumed valid. *See* 35 U.S.C. s. 282. FN4 The presumption of validity includes a presumption that the patent complies with the enablement requirement of 35 U.S.C. s. 112. *See* *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 941 (Fed.Cir.1990). "Invalidity for lack of enablement is a conclusion of law and must be supported by facts proved by clear and convincing evidence...." *Id.*; *see also* *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1375 (Fed.Cir.1986) (holding that the party attacking validity has the burden of proving invalidity by clear and convincing evidence).

FN4. 35 U.S.C. s. 282 provides, in pertinent part:

A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple

dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim.

The enablement requirement of 35 U.S.C. s. 112 provides that the specification of the patent must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation. *National Recovery Techs., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1195 (Fed.Cir.1999); *In re Wright*, 999 F.2d 1557, 1561 (Fed.Cir.1993). The first paragraph of 35 U.S.C. s. 112 states:

The specification shall contain a written description of the invention, and of 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, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The enablement requirement ensures that the public knowledge is enriched by the patent specification to a degree at least commensurate with the scope of the claims. *National Recovery*, 166 F.3d at 1195-96. "If by following the steps set forth in the specification, one of ordinary skill in the art is not able to replicate the claimed invention without undue experimentation, the claim has not been enabled as required by s. 112, paragraph 1." *Id.* at 1196.

Lack of enablement and absence of utility are closely related grounds of unpatentability. *Process Control Corp. v. Hydroclaim Corp.*, 190 F.3d 1350, 1357 (Fed.Cir.1999) (citing *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 956 (Fed.Cir.1983)). The utility requirement of 35 U.S.C. s. 101 requires that a patentable invention be useful and, accordingly, the subject matter of the claim must be operable.FN5 *Id.* "When a claim requires a means for accomplishing an unattainable result, the claimed invention must be considered inoperative as claimed and the claim must be held invalid under either s. 101 or s. 112 of 35 U.S.C." *Raytheon*, 724 F.2d at 956.

FN5. 35 U.S.C. s. 101 provides:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

[24] In this case, the undisputed evidence suggests that the claims of the '532 and '123 patents must enable one skilled in the art to clean semiconductor wafers using the Full Flow system. During the *Steag* trial, Walter testified that "we were designing and building a cleaning machine." The common specification for the '532 and '123 patents states that the "processes and apparatus of the present invention are especially useful in the prediffusion cleaning of wafers...." The independent claims in both patents recite a method or apparatus for "cleaning," "treatment," or "wet processing" of wafers and the parties do not dispute that "cleaning" is one type of "treatment" or "wet processing." Moreover, in the prosecution of the patents, the inventors stated that their Full Flow system reduced "the risk of introducing contaminants while simultaneously improving the yield of non-defective devices." Therefore, in order to satisfy the enablement requirement of 35 U.S.C. s. 112, the '532 and '123 patents must teach those skilled in the art how to clean

semiconductor wafers without undue experimentation.

The evidence shows that the Full Flow system that was based on the '532 and '123 patents could not clean semiconductor wafers. The inventors testified under oath that the wafers processed in the Full Flow system were "horrible," "terrible" and "filthy." The inventors experimented with the Full Flow system for more than six months during which time, they made "hundreds and hundreds" of modifications to the system. The fact that the solution to the problem eventually resulted in the '761 patent demonstrates that the experimentation required to enable the '532 and '123 patents was not routine.

CFMT argues that its Full Flow system performed according to the patent specifications even though the wafers processed in the system did not meet the level of cleanliness required by Texas Instruments. The testimony of the inventors during the *Steag* trial, however, demonstrates that the wafers were not clean by any standard. According to CFMT's own experts, when the wafers first emerged from the Full Flow system they had more than 50,000 particle defects per wafer. And even after the inventors cleansed the system with ultra-pure water for several days, Walter testified, "we still had a problem." In short, even the inventors themselves could not clean semiconductor wafers using the Full Flow system. Therefore, the court will grant YieldUP's motion for summary judgment that the '532 and '123 patents are invalid for lack of enablement.

The court will enter an order in accordance with this opinion.

D.Del.,2000.

CFMT, Inc. v. Yieldup Intern. Corp.

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