

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

CFMT, INC. and CFM TECHNOLOGIES,)	
INC.,)	
)	
Plaintiffs,)	
)	
v.)	Civil Action No. 98-790-RRM
)	
YIELDUP INTERNATIONAL CORP.,)	
)	
Defendant.)	

OPINION

Josy W. Ingersoll, Esquire and John W. Shaw, Esquire, Young, Conaway, Stargatt & Taylor, LLP, Wilmington, Delaware; David C. Berry, Esquire, Douglas J. Kline, Esquire and Stephen D. Whetstone, Esquire, Testa, Hurwitz & Thibeault, LLP, Boston, Massachusetts; counsel for plaintiffs.

Mary B. Graham, Esquire, Morris, Nichols, Arsht & Tunnell, Wilmington, Delaware; Susan K. Knoll, Esquire, L. Gene Spears, Esquire and James C. Pistorino, Esquire, Howrey Simon Arnold & White, LLP, Houston, Texas; counsel for defendant.

Wilmington, Delaware
June 6, 2001

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. was a Delaware corporation with its principal place of business in Mountain View, California. In October 1999, YieldUP was acquired by FSI International, Inc., a Minnesota corporation with its principal place of business in Chaska, Minnesota. YieldUP currently operates as a subsidiary of FSI named SCD Mountain View, Inc.

On December 30, 1998, CFMT, Inc. and CFM (collectively, “CFMT”) filed a complaint alleging that YieldUP infringed 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 moved for summary judgment that the ’532 and ’123 patents are invalid because the patents’ specifications are non-enabling. On January 7, 2000, YieldUP filed its Second Amended Answer and Counterclaims alleging that CFMT had engaged in inequitable conduct during the prosecution of Application Serial No. 765,294 (the “’294 application”), which eventually led to the issuance of the ’532

and '123 patents. YieldUP specifically contends that the CFMT inventors failed to disclose and misrepresented material information concerning test results to the PTO. On January 31, 2000, CFMT moved for summary judgment that the patents are enabling.

On April 4, 2000, the court granted summary judgment that the '123 and '532 patents are invalid for failure to comply with the enablement requirement of 35 U.S.C. § 112.¹ On April 20, 2000, CFMT moved to dismiss YieldUP's allegations of inequitable conduct for lack of subject matter jurisdiction. On May 4, 2000, the court denied the motion. On July 28, 2000, the court held a one day trial to determine whether CFMT engaged in inequitable conduct. At the trial, CFMT moved for judgment on partial findings that it had not engaged in inequitable conduct. This is the court's post-trial decision.

1. PROCEDURAL AND FACTUAL BACKGROUND

The court draws the following facts from evidence presented at the July 28, 2000 trial, the statement of undisputed facts in the joint pre-trial order and the court's prior

¹35 U.S.C. § 112 provides:

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.

opinion in this matter.

1. General Description of the Technology

The patents in suit relate to technology for cleaning silicon wafers during the process of manufacturing computer chips. 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 allow the chip to interact with the computer or other equipment in which it is used. The process of manufacturing computer chips requires more than 200 steps in which discs of silicon, called semiconductor wafers, are repeatedly etched and implanted with circuitry. Over forty of these steps are wet processing steps where the wafers are subjected to process fluids.

Prior to the patents in suit, the individual wet processing steps involved 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 wafers' microscopic circuits. In subsequent processing steps, when layers or coatings were added to the wafers, the contaminants could become trapped or "burned into" the wafers, resulting in defective computer chips.

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 same inventors. 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, the likelihood of contamination by airborne particles is reduced because the wafers do not move through the atmosphere from one process fluid to another.

The '532 and '123 patents were based on a prototype that McConnell and Walter began 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 '294 application that ultimately issued as the '532 patent.

C. The Prosecution of the '294 Application and the Concurrent Marketing and Testing of the Full Flow System

1. The inventors submit the '294 application

On August 13, 1985, 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"

2. CFMT begins to market the Full Flow system

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.”

3. The examiner rejects the '294 Application

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. § 103 based on the prior art references of Aigo and Gluck.² 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.”

4. CFMT initiates testing of the Full Flow system

Also in late 1986, CFMT reached an agreement with Texas Instruments to test a second prototype or “beta tool” as disclosed in the '294 application. The agreement required CFMT to ship the Full Flow vessel to Texas Instruments before receiving payment. McConnell and Walter took turns visiting Texas Instruments' facility in Sherman, Texas to help set up the system and take part in the testing.

² 35 U.S.C. § 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.

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. The inventors were surprised by how “filthy” the wafers looked.

5. The inventors discover the problem

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.

McConnell stated:

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.

6. The inventors amend the '294 application in response to the November 26, 1986 rejection

Meanwhile, 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.

7. The inventors solve the problem

Between April and July of 1997, 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 and correct the problems of the invention disclosed in the ’294 application. McConnell and Walter later applied for a patent on this process as a continuation in part of the application. The process would later become the subject of the U.S. Patent No. 4,911,761 (the ’761 patent).

8. The examiner again rejects the ’294 application

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 of 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, patent 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.

9. The inventors amend the '294 application in response to the July 10, 1987 rejection

On December 10, 1987, the inventors submitted a proposed amendment in response to the obviousness 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, namely Aigo. 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. There, the inventors listed the following eleven advantages distinguishing the prior art:

1. Reduction of contamination by airborne particles;
2. Reduction of contamination from human or robotic operators;
3. Good heat transfer between process chemicals and wafers;
4. Uniform exposure of the wafers to reagent chemicals at uniform concentrations for precisely limited periods of time;
5. Reduction of hazards to personnel by minimizing exposure to chemicals;
6. Minimizing stagnant conditions and avoiding filming effects;
7. Providing a mechanically simple process and apparatus which follow for easy operation and cleaning while minimizing the possibility of contaminant build-up in the apparatus;
8. The reduction of quantities of hazardous process fluids used due to recirculation of the process fluids;
9. The ability to provide quality drying fluids to displace the residual

- rinsing fluid;
10. The ability to provide a high-quality rinsing fluid having both suspended solids and low dissolved impurities; and
 11. The ability to provide high flow rates of rinsing fluid to rinse the wafers and precisely dilute concentrated chemical reagents.

In summary, 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.”

10. The examiner allows the '532 patent

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.

11. The PTO issues the '123 patent

On November 6, 1989, the PTO issued the '123 patent to CFM as assignee of McConnell and Walter.

12. The PTO issues 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 discloses the solution to the problems of the '532 and '123 patents, which is 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 described as an “improvement which may be substituted for the steam or

chemical drying systems” of the ’532 patent.

D. 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 pursuant to 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 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. On June 30, 1998, however, the court granted CFMT’s motion for reargument and allowed the parties to submit supplemental briefs on YieldUP’s motion for summary judgment. That 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. At trial, STEAG asserted a

number of invalidity defenses, one of which was that the '761 claims were invalid because the claimed invention was on sale or in public use by April 20, 1987, one year prior the '761 application date of April 20, 1988. In an effort to rebut this argument, McConnell and Walter testified at trial about the problems they encountered in the Spring of 1987 when the Full Flow system was initially tested at Texas Instruments. McConnell stated:

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.

Based on this testimony, CFMT argued that there could be no public use one year before the application date because the Full Flow system did not work prior to April 20, 1987.

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, and that the invention was not in public use prior to April 20, 1987. 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). The parties settled the case before review on appeal.

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 was infringing 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 moved for a summary judgment that the '532 and '123 patents were invalid because the patents' specifications were non-enabling. In support of its motion, YieldUP cited McConnell and Walter's testimony during the STEAG trial, in which they described the wafers that emerged from the Full Flow system as "filthy" and "terrible." YieldUP contended that McConnell and Walter admitted that it took them six months of experimentation to solve the problem with the Full Flow system, and therefore, the previously submitted '294 application setting forth the system with the problem could not possibly have been enabling.

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

On April 4, 2000, the court granted summary judgment that the '123 and '532 patents are invalid for failure to comply with the enablement requirement of 35 U.S.C. § 112. The court found that:

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 [in the STEAG trial] 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.

On April 20, 2000, CFMT moved to dismiss YieldUP's allegations of inequitable conduct for lack of subject matter jurisdiction. On May 4, 2000, the court denied the motion. On July 28, 2000, the court held a one day trial to determine whether the CFMT inventors had engaged in inequitable conduct. At the trial, CFMT moved for judgment on partial findings that it had not engaged in inequitable conduct.

II. DISCUSSION

Inequitable conduct requires clear and convincing evidence of: (1) information that is material; (2) knowledge chargeable to the patent applicant of such information and its materiality; and (3) the applicant's failure to disclose or misrepresentation of such information as a result of an intent to mislead the PTO. See FMC Corp. v. Manitowoc Co., Inc., 835 F.2d 1411, 1415 (Fed. Cir. 1987); see also Key Pharmaceuticals v. Hercon Labs. Corp., 161 F.3d 709, 719 (Fed. Cir 1998). Once materiality and intent have been established, "the court conducts a balancing test and determines whether the scales tilt to a conclusion that 'inequitable conduct' occurred." Critikon, Inc. v. Becton Dickinson Vascular Access, Inc., 120 F.3d 1253, 1256 (Fed. Cir 1997). In balancing materiality and intent, the more material the omission or the misrepresentation, the lower the level of intent required to establish inequitable conduct, and *vice versa*. See id.

YieldUP alleges that the CFMT inventors engaged in inequitable conduct in two ways. First, YieldUP explains that in response to the examiner's July 10, 1987 rejection for obviousness, the inventors distinguished prior art by representing in their amendment

that the Full Flow system produced unexpected positive results. YieldUP contends that the inventors' statements constituted a material misrepresentation because they contradicted the Texas Instruments test data (the "TI data"), which show that the system described in the specification is ineffective. Second, YieldUP contends that the inventors engaged in inequitable conduct when they failed to disclose the TI data as it related to enablement.

YieldUP argues that in both instances, the inventors knew that the TI data were material to the prosecution of the '294 application. YieldUP further argues that the inventors misrepresented and withheld the TI data in order to mislead and deceive the PTO.

CFMT counters that YieldUP has not established that the TI data or the inventors' statements were material to the prosecution of the '294 application, nor has it offered any evidence that the inventors knew the TI data or their statements to be material. CFMT also argues that YieldUP has produced no evidence of an intent to mislead or deceive the PTO. Finally, CFMT contends that YieldUP cannot allege inequitable conduct based on enablement because it did not disclose enablement as a basis for the charge in its original or amended answer and counterclaims.

The Federal Circuit has explained that a patent applicant's duties with respect to the disclosure and representation of information to the PTO arise under the general duty of candor, good faith and honesty found in 37 C.F.R. § 1.56(a) (1996), also known as Rule 56. See Critikon, 120 F.3d, at 1265. Specifically, patent applicants and their patent

attorneys have a duty to disclose to the PTO known information material to the examination of the application. See id.

To resolve this dispute, the court must therefore decide whether YieldUP has shown by clear and convincing evidence that the inventors: (1) breached the duty of candor by misrepresenting or failing to disclose information that was material to the prosecution of the '294 application; (2) knew or should have known that the information was material; and (3) breached the duty of candor with the intent to mislead or deceive the PTO.

A. Did the Inventors Breach the Duty of Candor by Misrepresenting or Failing to Disclose Information that was Material to the Prosecution of the '294 Application?

The parties' dispute over the duty of candor and materiality is based on three issues. First, the parties disagree as to the applicable standard for materiality. Second, they dispute whether the inventors misrepresented the TI data to the PTO and whether the data were material to the examiner's determination that the '294 application was not obvious. Third, they dispute whether the inventors had a duty to disclose the TI data and whether the data were material to the examiner's finding that the '294 application was enabling.

1. Materiality

Prior to 1992, materiality was defined as whether "there [wa]s a substantial likelihood that a reasonable examiner would have considered th[e] information important in deciding whether to allow the application to issue as a patent." Molins PLC v.

Textron, Inc., 48 F.3d 1172, 1179 n. 8 (Fed. Cir. 1995). In 1992, the PTO amended the regulation governing materiality “to address criticism concerning a perceived lack of certainty in the materiality standard.” 57 Federal Register 2023 (Jan. 17, 1992); Manual of Patent Examining Procedure § 2001.04 (1996). Rule 56(b), as amended, provides in relevant part, that information is material to patentability when:

- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
- (2) it refutes, or is inconsistent with, a position the applicant takes in:
 - (i) opposing an argument of unpatentability relied on by the Office [(PTO)], or
 - (ii) asserting an argument of unpatentability.

37 C.F.R. § 1.56(b) (1996); see also Manual of Patent Examining Procedure § 2001.05.

An applicant has no duty to submit information that is not material to the patentability of any existing claim. See 37 C.F.R. § 1.56. Moreover, the PTO has explained that “[w]hile information may be material under the definition, there is no duty on an individual to disclose the information if the information is unknown to the individual.” 57 Federal Register 2026 (Jan. 17, 1992). The PTO has also noted that “there can be no duty to disclose the information if it is material only in combination with unknown information.” Id.

The parties dispute whether the pre-1992 or post-1992 standard for materiality applies in this case. In accordance the post-1992 amended standard, YieldUP argues that the court already determined that the undisclosed TI data are clear and convincing evidence of invalidity for non-enablement in CFMT, Inc. v. YieldUP, 92 F. Supp. 2d 359

(D. Del. 2000). Thus, the same data must be sufficient to establish a prima facie case of unpatentability, which requires a far lesser showing than “clear and convincing evidence.” CFMT counters that YieldUP is applying the wrong standard for determining materiality. It argues that the pre-1992 version of Rule 56 applies in this instance because the prosecution of the ’294 application occurred prior to 1992.

In 1988, the Federal Circuit was faced with a similar issue when the parties in In re: Harita disputed whether the pre-1982 or post-1982 version of Rule 56 applied to an inequitable conduct action arising from events that occurred in 1975. See 847 F.2d 801, 807 (Fed. Cir. 1988). In resolving the dispute, the court stated:

In the intervening dozen years, the applicable rules of law and the practice pertaining to the disclosure of prior art to the PTO have undergone substantial developments and change and, indeed, are still doing so. What was once simply called “Fraud on the patent office,” at least in its violation of a duty to disclose aspect, now bears the name “inequitable conduct” and is governed by the rules first promulgated on January 28, 1977, and amended in 1982, 1983, 1984 and 1985. We therefore deem it essential to consider this case in light of the situation as it existed when the acts deemed to bar this reissue took place.

Id. (citing Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 1551 (Fed. Cir. 1983)

(“[W]e are not at liberty . . . to apply the present standard retroactively.”)).

In accordance with the Federal Circuit’s approach in Harita, this court will apply the pre-1992 standard for materiality, the applicable standard at the time of the prosecution. Therefore, the court must determine whether there is a substantial likelihood that a reasonable examiner would have considered the TI data important in deciding whether to allow the ’294 application to issue as a patent.

2. The Obviousness Rejection

In determining whether the inventors breached the duty of candor by misrepresenting information material to the July 10, 1987 rejection for obviousness, the court must initially decide whether the inventors' statements were accurate. If the inventors' statements were inaccurate, the court must then determine whether the information related to the statements was material to the examiner's determination that the '294 application was not obvious. Finally, if the inaccurate statements related to material information, the court must decide whether the inventors breached the duty of candor by making such statements.

a. Were the statements inaccurate?

YieldUP argues that the TI data refute the inventors' statements explaining that they had reached unexpected positive results in response to the examiner's July 10, 1987 rejection for obviousness. YieldUP contends that the inventors had observed no such results. In fact, according to YieldUP, the only information available to the inventors at the time of the rejection was the TI data, which documented overwhelmingly negative results. Thus, YieldUP argues that the statements were inaccurate.

CFMT counters that the list of advantages is accurate, and the statement "[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" is "concluding argument" offered by an attorney rather than an enumerated statement of fact. Thus, according to CFMT, the court should not consider the net effect statement.

Moreover, CFMT argues that even if it does, the court should limit the meaning of the term “contaminates” to “airborne particles” because YieldUP focuses its allegations on the first of the eleven enumerated distinctions, which refers only to airborne particles. CFMT contends that at the time of the amendment, the Full Flow system did reduce airborne particles, and therefore, the inventors’ statements in response to the obviousness rejection were accurate.

The court will consider the net effect statement as a summary of the advantages distinguishing the Full Flow system from the Aigo tool. The inventors and patent counsel clearly intended the statement to reflect the overall difference between the Aigo tool and the system, and as such, it has the same effect as the eleven enumerated advantages. Moreover, the court interprets the statement to summarize all of the enumerated advantages. As a result, the term “contaminates” includes not only the “airborne particles” of the first advantage, but also the “filming effects” of the sixth advantage, the general “contaminant build-up” of the seventh advantage and any other contaminates set forth in the list. Given the nature of the TI data, the court concludes that the inventors’ statements in response to the obviousness rejection were inaccurate and constituted a misrepresentation.

- b. Was the subject of the misrepresentation material to the examiner’s determination that the ’294 application was not obvious?

YieldUP argues that a reasonable examiner would have considered the inventors' statements in allowing the '294 application to traverse the obviousness objection.

YieldUP thus contends that the misrepresented information was material to the prosecution of the '532 patent. CFMT counters that a reasonable examiner would not have considered non-comparative data in response to an obviousness rejection.

The examiner allowed the '294 application to traverse the obviousness rejection, at least in part, because the inventors submitted misinformation concerning the advantages of the invention over the prior art. The court finds that a reasonable examiner would have considered data rebutting such advantages in deciding whether to allow the '294 application to issue as a patent. Therefore, the court concludes that the TI data were material to the examiner's determination that the '294 application was not obvious.

c. Did the inventors breach the duty of candor by making the misrepresentation?

CFMT argues that even if the inventors' statements were inaccurate and material, the inventors did not breach the duty of candor in responding to the examiner's obviousness rejection. CFMT explains that the Manual of Patent Examining Procedure, which addresses applicants' use of comparative tests, provides that test data are only probative in overcoming an obviousness rejection if they compare or relate an applicant's test results to the cited prior reference. The Manual of Patent Examining Procedure states that "affidavits and declarations may be classified in five groups," one of which is entitled "Comparative Tests or Results." Manual of Patent Examining Procedure Rule

716. The manual also states that “affidavits or declarations comparing applicants’ results with those of the prior art must relate to the reference relied upon and not other prior art.”

Id. Based on these passages, CFMT argues that the examiner’s obviousness rejection required the inventors to respond with comparative information.

CFMT contends that there is no dispute that the TI data do not directly compare the Full Flow system to the Aigo tool, and as such, the data are irrelevant as a matter of law to the inventors’ statements distinguishing Aigo. CFMT therefore argues that the inventors had no duty to submit the data.

The inventors, however, did not simply withhold the TI data. Rather, they misrepresented the effectiveness of their invention by submitting statements inconsistent with the data. Thus, even if there is no duty to submit non-comparative data in response to an examiner’s obviousness rejection, the duty of candor, good faith and honesty certainly prohibits applicants from misrepresenting the nature of their test results in order to overcome such a rejection. Thus, the court concludes the inventors breached the duty of candor.

3. Enablement

In determining whether the inventors breached the duty of candor by failing to submit information material to enablement, the court must decide whether undisclosed information pertaining to enablement can ever be material in the context of inequitable conduct. If information related to enablement can be material, then the court must decide whether the TI data were material to the enablement of the ’294 application. Finally, if

the TI data were material, the court must determine whether the inventors breached the duty of candor by failing to disclose the data to the PTO.

- a. Can failure to disclose information pertaining to enablement be material in the context of inequitable conduct?

YieldUP argues that even though most relevant authority addresses inequitable conduct in terms of an applicant withholding evidence of prior art, the same standard applies to an applicant that withholds information relating to enablement. CFMT responds that inequitable conduct cannot result from an applicant's withholding of information pertaining to enablement, but rather, the information must concern prior art.

In Enzo Biochem, Inc. v. Calgene, Inc., the Federal Circuit affirmed this court's finding of non-enablement, but vacated the court's decision in part because it "erred in not making an inequitable conduct determination prior to ruling on the exceptional case issue." 188 F.3d 1362, 1380 (Fed. Cir. 1999). From Enzo Biochem, this court concludes that undisclosed information concerning enablement can be material and so as to justify a finding of inequitable conduct.

- b. Were the TI data material to enablement?

In light of the court's previous decision in CFMT invalidating the '532 and '123 patents for lack of enablement based on the TI data, the court finds that a reasonable examiner would have considered the data in deciding whether to allow the '294 application to issue as a patent. See CFMT, 92 F. Supp. 2d 359. Thus, the TI data was material to the prosecution of the '294 application.

c. Did the inventors breach the duty of candor by failing to disclose the TI data?

The Federal Circuit has explained that a patent applicant's duties with respect to the disclosure and representation of information to the PTO arise under the general duty of candor. See Critikon, 120 F.3d, at 1265. The inventors failed to disclose material data showing that their invention, as described in the '294 application, was highly ineffective. This failure was inconsistent with candor, good faith and honesty, and as such, the court concludes that the inventors breached the duty.

B. Is Knowledge of the TI Data's Materiality Chargeable to the Inventors?

To prevail on an inequitable conduct claim, the party attacking the conduct must demonstrate through clear and convincing evidence that the applicant knew of the information and its materiality during the prosecution. See e.g., FMC Corp. v. Manitowoc Co., Inc., 835 F.2d 1411 (Fed. Cir 1987). The PTO has explained that “[w]hile information may be material under the definition, there is no duty to disclose the information if the information is unknown to the individual.” 57 Federal Register 2026 (Jan. 17, 1992).

1. Did the inventors know that the TI data were material to the examiner's determination that the '294 application was not obvious?

YieldUP argues that when the inventors distinguished Aigo in part by telling the PTO that the Full Flow system reduced “the risk of introducing contaminants while

simultaneously improving the yield of non-defective semiconductor devices,” they knew their statement misrepresented material information. CFMT again relies on the Manual of Patent Examining Procedure in arguing that the inventors and patent counsel believed that the TI data were immaterial because they did not directly compare the system to the Aigo tool. In support of its position, CFMT points to the following trial testimony by their patent counsel:

Q: Would you have submitted . . . an affidavit or declaration – to show unanticipated results that contained data that wasn’t a direct comparison between the performance of the subject matter being prosecuted and the art that was relied upon by the Examiner in rejecting the application?

A: No. That would have been a waste of time.

Having reviewed the parties’ arguments, the court finds CFMT’s reliance on the non-comparative nature of the TI data is misplaced. In the July 10, 1987 rejection for obviousness, the examiner asked for distinctions between the Aigo tool and the Full Flow system. The inventors responded with eleven differences and the net effect statement. At that time, the inventors were in possession of the TI data documenting the failure of the system to reduce the risk of contamination. Their response to the rejection directly contradicted the TI data. Based on the this direct contradiction, the inventors should have known that the TI data were material.

With regard to the manual, as previously explained, the inventors did not simply fail to submit the TI data to the PTO, but misrepresented the results found in the data. As such, even if the manual justified the omission of the TI data, the inventors could not

have reasonably read the manual to allow misrepresentation of the data. In light of these circumstances, the court concludes that the inventors knew or should have known that the TI data were material to the examiner's determination that the '294 application was not obvious.

2. Did the inventors know that the TI data were material to enablement?

YieldUP argues that the inventors were aware that the TI data was material to the issue of enablement. In support of its position, YieldUP contends that the inventors must have known that wafers processed in open tank cleaning systems were cleaner than those processed in the Full Flow system. Thus, they must have known that their invention, which was supposed to reduce the contamination of wafers, but actually produced "terrible" and "filthy" wafers when tested by Texas Instruments, was actually less effective than conventional processing systems. Therefore, YieldUP contends that the inventors were aware that the data were material to enablement of the patent.

CFMT counters that YieldUP has not proven by clear and convincing evidence that the inventors knew the data were material. CFMT explains that there is no evidence that the inventors ever considered enablement to be an issue during the examination, nor did they consider the data to be relevant to enablement. Further, according to CFMT, the inventors were surprised by the very first tests at Texas Instruments that showed excessive contamination, but by March 3, 1987, after the prototype had been adjusted and cleaned, the first valid performance data showed that the prototype was performing as

well as or better than a lot of the other processing equipment. CFMT explains that by May 26, 1987, the Full Flow system was adding less than fifty particles per wafer, and therefore, the inventors did not consider the initial TI data material, and there is no evidence to the contrary.

The problem with CFMT's argument is that the improvement in performance of the invention resulted from "hundreds and hundreds" of modifications to the system and eventually resulted in the '761 patent. The invention as described in the '294 application was highly ineffective. The fact that the inventors eventually improved the invention through hundreds of modifications does not negate the relevance of the TI data to the invention described in the application. Furthermore, the court finds it implausible that neither the inventors nor patent counsel recognized this relevance. After all, the inventors engaged in hundreds of modifications after receiving the TI data. The court therefore concludes that the inventors knew or should have known that the TI data were material to enablement.

C. Were CFMT's Breaches of the Duty of Candor the Result of an Intent to Mislead the PTO?

To show an intent to mislead, "clear and convincing evidence must prove that an applicant had the specific intent to accomplish an act that the applicant ought not to have performed [such as] misleading or deceiving the PTO." Molins PLC v. Textron, Inc., 48 F.3d 1172, 1181 (Fed. Cir. 1995). In determining intent, the court views the involved conduct in light of all the evidence, including evidence indicative of good faith. "Direct

proof of wrongful intent is rarely available, but may be inferred from clear and convincing evidence of the surrounding circumstances.” Labounty Manufacturing, Inc. v. United States Int’l Trade Comm’n, 958 F.2d 1066, 1076 (Fed. Cir. 1992) (citations omitted). “[I]ntent may be inferred where a patent applicant knew, or should have known, that withheld information would be material to the PTO’s consideration of the patent application.” Critikon, 120 F.3d, at 1256. Moreover the Federal Circuit has stated that:

No single factor or combination of factors can be said always to *require* an inference of intent to mislead; yet a patentee facing a high level of materiality and clear proof that it knew or should have known of that materiality, can expect to find it difficult to establish “subjective good faith” sufficient to prevent the drawing of an inference of intent to mislead. A mere denial of intent to mislead (which would defeat every effort to establish inequitable conduct) will not suffice in such circumstances.

FMC Corp., 835 F.2d, at 1416 (original emphasis).

1. Was the inventors’ misrepresentation of the TI data the result of an intent to mislead the PTO?

As evidence of the inventors’ intent to misrepresent material information and mislead the PTO, YieldUP refers the court to a series of circumstances that, it argues, establish an inference of intent to deceive. First, in connection with the obviousness rejection, the examiner pressed Schwarze, CFMT’s patent counsel, for a showing of unexpected results. Second, Schwarze, when confronted with such a request, would as a matter of practice ask his client to provide him with information regarding unexpected results. Third, Schwarze was aware that his clients were building tools, and that data

from those tools were likely available. Fourth, on five occasions between the final rejection and the representation of unexpected results, Schwarze made a written request for information from the inventors to be used in the prosecution. Fifth, on two occasions, Walter was prepared to accompany Schwarze to Crystal City to meet with the examiner. Sixth, the inventors knew that the invention described in the '294 application could not clean wafers. Seventh, the only data in the possession of the inventors permitting a comparison between their Full Flow system and the prior art demonstrated profoundly inferior testing results. Eighth, the inventors represented results inconsistent with that data to the examiner. Ninth, Walter reviewed the representations before they were submitted to the examiner.

YieldUP argues that given the multiple requests for information put to them, the inventors must have known that the TI data were relevant to arguments that Schwarze would make for patentability over the prior art. YieldUP further argues that CFMT attorneys concocted a false justification for non-disclosure based on the notion that the filthy Texas Instruments wafers were material only if the examiner was lucky enough to cite the right reference. YieldUP contends that this position does not accurately convey the inventors' thought processes as reflected in the following testimony of Schwarze:

Q: Are you here to tell this court that in 1987, you made a conscious decision that the only particle data that would be relevant to this patent application would be data comparing CFM's particle performance to the Aigo open tank specifically?

A: I don't know that I was even focusing on particle contamination in particular. And we're talking about the invention as a whole: Aigo,

whatever it did, versus our invention, whatever it did. And particle contamination is not the whole story of either of these inventions So I can't say – to answer your question, I can't say I was focusing on saying that was – particle data was the only thing I was considering between those two inventions.

Q: In 1987, did you give Alan Walter any reason to believe that if he had particle performance data that would allow him to compare his tools to a wet bench that wasn't specifically the Aigo system, that the data would not be relevant to this patent application, and that data could be kept from the Patent Office?

A: Again, I don't know that I ever focused on particle contamination in anything I may have said. But I don't recall what I – what I discussed at the time.

Furthermore, YieldUP argues that CFMT had many reasons to conceal the TI data. For example, after three years of operation, CFMT was yet to sell a product, which made CFMT investors nervous. CFMT could only point to its applications and patents as evidence of future success. Thus, YieldUP argues that CFMT sought to protect the applications at all cost. Finally, YieldUP contends that CFMT has produced no evidence of good faith to refute an inference of intent to deceive.

CFMT counters that the evidentiary record is devoid of any evidence of intent on the part of the inventors or their counsel to deceive the PTO. CFMT specifically argues that the net effect statement distinguishing Aigo focused upon by YieldUP is but one statement submitted during a four and a half year prosecution. CFMT urges the court to consider the totality of the applicants' conduct in light of all the evidence. CFMT argues that its conduct actually reflects good faith and candor. CFMT also reiterates its position that the TI data were immaterial to the Aigo obviousness rejection, and even if they are

not, the inventors held a good faith belief that they were immaterial.

CFMT also rejects YieldUP's suggestion that the decision to withhold the data was driven by financial interests. In support of its position, CFMT points out that it is not uncommon for companies, especially start-up companies, to apply for patents before achieving market penetration. According to CFMT, such applications do not support an inference of deception. Finally, CFMT contends that Schwarze requested information that complied with the Manual of Patent Examining Procedure. Because there were no such data, CFMT argues, there should be no inference of deceit.

In Critikon, the Federal Circuit noted that the more material the omission or the misrepresentation, the lower the level of intent required to establish inequitable conduct. 120 F.3d at 1256. In this case, the materiality of the misrepresentation is substantial, and therefore, the level of intent required to find inequitable conduct is relatively low.

As a baseline for determining whether there was an intent to deceive, the court begins with the understanding that at the time of the final rejection for obviousness, the inventors' were in possession of test results demonstrating that their invention did not perform the function claimed in the application. The examiner eventually rejected the application as obvious in light of Aigo. To distinguish the invention, the inventors and patent counsel submitted a statement inconsistent with the test results. The examiner, in turn, allowed the application to traverse the rejection.

With regard to CFMT's recurring central argument relying on the Manual of Patent Examining Procedure, the court restates its previous conclusion that had the

inventors simply failed to mention the negative results and submitted distinguishing information unrelated to these results, CFMT's argument would be stronger. The inventors, however, not only withheld the data, but they stated that the Full Flow system reduced the risk of contamination of wafers in complete contradiction to the test results. Given these circumstances, the court cannot infer good faith reliance on the manual. Therefore, the court concludes that the inventors intended to mislead the examiner when they submitted their amendment to traverse the obviousness rejection.

2. Was the inventors' failure to disclose the TI data the result of an intent to deceive the PTO?

The parties have not submitted argument specific to whether the inventors' failure to disclose the TI data in the context of enablement was the result of an intent to mislead the PTO. Nevertheless, the court recognizes that the TI data prompted the inventors to solve the problems of the '294 application. This effort resulted in the '761 patent. Given that the solution justified the issuance of a new patent, the court concludes that the inventors knew, or should have known, that the TI data were material to the PTO's consideration of the '294 application. In light of the data's materiality and the inventors' knowledge, the court will infer an intent to deceive the PTO.

D. Should the Inventors' Breach of the Duty of Candor Regarding Enablement Serve as a Basis for Judgment?

CFMT argues that the court should reject any argument by YieldUP that the TI data are material to enablement because YieldUP never raised the theory in its pleadings or answers to interrogatories. Thus, CFMT contends that the court should not allow

YieldUP to add the theory at this point in the proceedings.

In YieldUP's Statement of Issues of Fact that Remain to be Litigated from the Joint Pre-Trial Order, it states "[w]hether a person having a duty of disclosure failed to disclose information material to the patentability of the '532 patent with an intent to deceive the Patent and Trademark Office during prosecution of the '532 patent." In addition, at the time the pre-trial order was submitted, cross-motions for summary judgment based on enablement were pending before the court. In light of these circumstances, the court concludes that CFMT had fair notice of and was not prejudiced by YieldUP's inequitable conduct claim based on enablement.

III. CONCLUSION

In sum, the court concludes that inventors engaged in inequitable conduct during the prosecution of the '294 application when they misrepresented the effectiveness of their invention in traversing the examiner's July 10, 1987 rejection for obviousness. The court further concludes that the inventors engaged in inequitable conduct when they failed to disclose information material to whether the '294 application was non-enabling. The court will enter an order directing judgment in favor of YieldUP.