

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

ADE CORPORATION,)
)
Plaintiff,)
)
v.)
) Civil Action No. 00-892-KAJ
KLA-TENCOR CORPORATION,)
)
Defendant.)
)

OPINION

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Wilmington, Delaware
March 13, 2003

JORDAN, District Judge

I. INTRODUCTION

This matter is before the Court for construction of the claims in U.S. Patent No. 6,292,259 B1 (issued Sept. 18, 2001) (the “259 patent”), pursuant to *Markman v. Westview Instruments, Inc.*, 52 F.3d 967 (Fed. Cir. 1995) (en banc), *aff’d*, 517 U.S. 370 (1996). Plaintiff ADE Corporation (“ADE”) and defendant KLA-Tencor Corporation (“KLA”) own United States patents used in the silicon wafer inspection industry to detect and classify silicon wafer surface defects as either crystalline originated pit defects or particle defects. On October 10, 2000, ADE filed its complaint in this action, alleging that KLA’s products infringed its U.S. Patent No. 6,118,525 (issued Sept. 12, 2000) (the “525 patent”). (D.I. 1.) KLA counterclaimed, alleging that ADE’s products infringed several of its patents, specifically U.S. Patent Nos. 5,226,118 (issued July 6, 1993); 5,883,710 (issued Mar. 16, 1999); 6,081,325 (issued June 27, 2000); and 6,215,551 (issued Apr. 10, 2001).¹ (D.I. 7.) Thereafter, ADE amended its complaint, claiming that KLA is infringing the ‘259 patent. (D.I. 232.) The Court’s magistrate judge previously provided an opinion recommending the proper construction of the ‘525, ‘118, ‘710, ‘325, and ‘551 patents. *See ADE Corp. v. KLA-Tencor Corp.*, 220 F. Supp. 2d 303 (D. Del. 2002). Those recommendations are the

¹Those patents are referred to herein as the ‘118, ‘710, ‘325, and ‘551 patents, respectively.

subject of still pending objections by both parties (see D.I. 531, 533) which are partially addressed in this opinion.²

II. THE '259 PATENT

A. In General

The technology underlying the '259 patent bears on the challenge of inspecting silicon wafers prior to their being manufactured into integrated circuits, also called "computer chips." All of the patents at issue in the case relate to a strategy for addressing that challenge. As is more fully described herein, the '259 patent teaches the use of a beam of specially polarized light that is directed at an angle to the surface of a silicon wafer or similar workpiece and manipulated to scan the surface for defects. The light deflected from the surface during the scan is then collected and analyzed to determine whether its deflection pattern is characteristic of one or the other of two types of silicon wafer defects, namely pit defects or particle defects. The distinction is important to chip manufacturers because particle defects can be cleaned off the wafer surface but pit defects, which, as the name implies, are actual flaws in the surface, cannot be. Thus, the accurate identification and classification of the two types of defects can lead to significant cost savings in the manufacturing process.

B. The '259 Disclosure

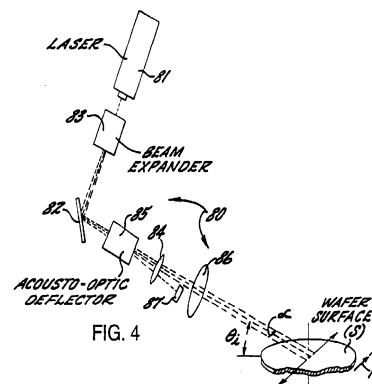
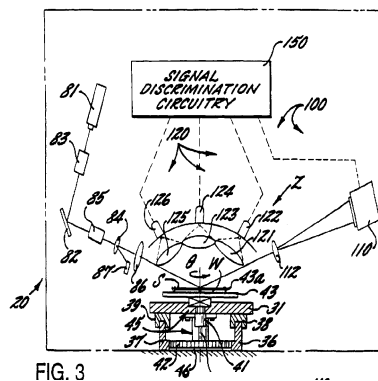
The '259 patent teaches a silicon wafer surface inspection system that uses a focused beam of P-polarized light to scan the surface of a silicon wafer or other workpiece.

²To the extent this Opinion does not address portions of the parties' objections to the magistrate judge's Report and Recommendation of claim construction of the '525, '118, '710, '325, and '551 patents, those matters will be dealt with in a separate opinion of the Court.

(D.I. 627, '259 Patent Prosecution File History, '259 patent at col. 1 ll. 39-56.) Claim 1 of the patent is representative of the invention:

1. A surface inspection system for distinguishing between particle defects and pit defects on a surface of a workpiece comprising:
 - an inspection station for receiving the workpiece;
 - a scanner positioned to scan a surface of the workpiece at the inspection station, the scanner including a light source arranged to project p-polarized light at an angle of incidence oblique to the workpiece surface;
 - a first collector positioned to collect light scattered from the surface of the workpiece at a central zone;
 - a second collector positioned to collect light scattered from the surface of the workpiece at an oblique zone offset angularly from the central zone;
 - one or more converters for converting the collected light components into respective signals representative of the light scattered into the central zone and oblique zone; and
 - a system controller configured to receive the signals, compare the signals, and classify defects as pits or particles based at least in part on the comparison.

(*Id.* at col. 12 ll. 18-38.) Figures 3 and 4, reproduced below, represent the preferred embodiment, as detailed in the '259 written description and drawings. (*Id.* at col. 5 l. 31 to col. 7 l. 5.)



The preferred embodiment employs a multi-piece scanner (depicted as item "80" in Figure 4) arranged to scan the surface of a workpiece with a beam of P-polarized light generated from a light source (item "81" in Figures 3 and 4). The beam of P-polarized light is directed at the surface of the workpiece with a mirror (item "82"), a deflector (item "85"), and optical lenses (items "84" and "86"). (*Id.*) As the beam of P-polarized light scans the surface of the workpiece, part of it refracts off the surface and is collected for analysis using a dark channel detector (item "120" in Figure 3) consisting of scattered-light collectors (items "121," "123," and "125") in optical communication with and electrically connected to a forward channel detector (item "122"), a center channel detector (item "124"), and a back channel detector (item "126").³ (*Id.* at col. 7 l. 24 to col. 8 l. 24.)

Figures 6 and 16, reproduced below, provide further information about the operation of the preferred embodiment.

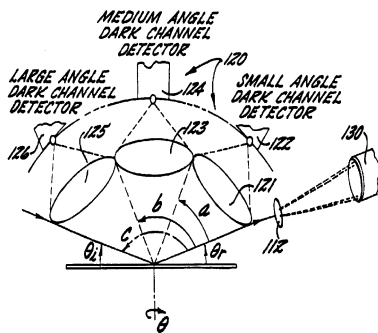


FIG. 6

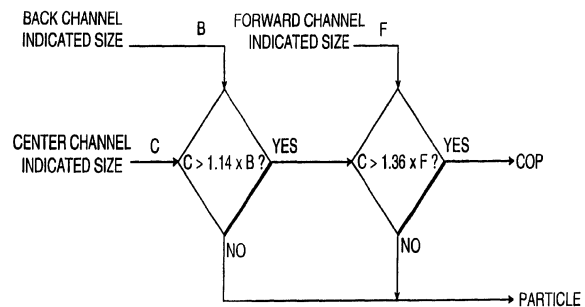


FIG. 16

As shown in Figure 6, the inventors specify that the placement of the three collectors (items "121," "123," and "125") is determined with reference to the angle of incidence

³ Light scattered upward, or into a central region, is sometimes referred to as "normally" scattered light, because an angle of 90 degrees to the surface of the wafer, or exactly perpendicular to the surface, is referred to as a "normal" angle. (See D.I. 595 at 5 n.2.)

(designated as “ θ_i ” in Figure 6) of the light beam directed at the wafer surface and the angle of refraction (designated as “ θ_r ”) of the light beam as it bounces off the wafer surface. The three collectors gather for analysis the light scattered from the wafer surface in forward, center, and backward regions. (*Id.*) The inventors specify a mathematical algorithm for processing the information about the scattered light (Figure 16), after it is collected in those regions.⁴ The operation of that algorithm is detailed in the ‘259 written description.⁵

In less technical terms, the invention works by bouncing a beam of light off the wafer surface and “reading” the scatter patterns of the light as it strikes a defect. When the beam strikes a particle defect, it tends to scatter light predominately outward, away from the center of the defect, so that, in the preferred embodiment, the forward and backward light collectors would register more scattered light than would the central light collector. When the beam strikes a pit defect the light is scattered more evenly.

⁴ The reference to “COP” in Figure 16 is to the term of art “crystalline originated particle,” which means a pit defect.

⁵Column 12 lines 19-36 of the ‘259 patent written description provide as follows:

FIG. 16 illustrates one suitable algorithm for analyzing the information from the detectors to distinguish particles from COPS. If the ratio of the center channel indicated size C to the back channel indicated size B is less than the predetermined constant, in this instance 1.14, then the defect is classified as a particle. Stated otherwise, a signal event B representing the back channel indicated size and a signal event C representing the center channel indicated size are directed to a comparator where the value of C is compared to the value of B times a predetermined constant, in this instance 1.14. If C is not greater than 1.14 times B, then the signal event is classified as a particle. If C is greater than 1.14 times B, then C is compared to a value F representing the forward channel indicated size. If C is greater than a predetermined constant (in this instance 1.36) times the value of F, then the signal event is classified as a COP. If not, the event is classified as a particle.

(D.I. 627, ‘259 Patent Prosecution File History, ‘259 Patent at cl. 12 ll. 19-36.)

C. The Prosecution Histories

The '259 patent stems from a lengthy chain of continuing applications which requires an extended description, as it figures prominently in the bases for the Court's decision. The '259 patent derives from a continuation application of U.S. Application Serial No. 08/958,230, filed October 27, 1997 (now the '525 patent), which, in turn, is a continuation-in-part of Application Serial No. 08/399,962, filed March 6, 1995 (now U.S. Patent 5,712,701 (issued Jan. 27, 1998) (the "701 patent"). The '701, '525, and '259 patent prosecution file histories, therefore, may aid the Court when construing the claims of the '259 patent. *See, e.g., Jonsson v. Stanley Works*, 903 F.2d 812, 817-21 (Fed. Cir. 1990).

1. The '701 Prosecution History

ADE's '701 patent is entitled "Surface Inspection System and Method of Inspecting Surface of Workpiece."⁶ Lee D. Clementi and Michael E. Fossey are the named inventors. Independent claim 1 of the '701 patent is representative of the invention:

1. A surface inspection system for detecting particles or defects on a surface of a workpiece, the surface inspection system comprising:

means for translationally transporting a workpiece along a material path;

means associated with said transporting means for rotating a workpiece during translational travel along the material path;

a scanner positioned and arranged to scan a surface of a workpiece during rotational and translational travel along the material path, said scanner including a light source arranged to generate a light beam therefrom and means positioned to

⁶ ADE has not asserted the '701 patent against KLA. Accordingly, the Court has had no occasion to construe its claims in this case.

receive the light beam and arranged for scanning the light beam along a predetermined scan path across a surface of the workpiece as the workpiece rotationally and translationally travels along the material path; and

a collector arranged for collecting light reflected as scattered from the surface of the workpiece during rotational and translational travel along the material path, said collector comprising:

a light channel detector arranged for detecting light specularly reflected from the surface of a workpiece; and

a dark channel detector positioned adjacent said light channel detector for detecting light scattered from the surface of a workpiece, said dark channel detector including a plurality of collectors positioned closely adjacent each other and arranged for collecting components of the scattered light at different respective predetermined angles from the surface of the workpiece.

(D.I. 627, '701 Patent Prosecution File History, '701 Patent at col. 14 ll. 6-37.)

The patent application leading to the '701 patent was originally filed with 44 claims. (See *id.* at '701 Patent Prosecution File History, Application Serial No. 08/399,962.) On March 4, 1996, an examiner at the United States Patent and Trademark Office ("PTO") allowed claims 8-21, 28-31, 33, 37, 38, 40-44; rejected claims 1-5, 22-27, 32, 34, 36, and 39; and objected to claims 6, 7, and 35. (*Id.* at '701 Patent Prosecution File History, Office Action mailed Mar. 4, 1996 at 1-3.) Claims 1-5 were rejected pursuant to 35 U.S.C. § 103(a)⁷ "as being unpatentable over Jann et al (US 5,189,481) in view of Yoshii et al (US

⁷Section 103(a) provides, in part, as follows:

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 of ordinary skill in the art to which said subject matter pertains.

35 U.S.C. § 103(a) (2003).

5,461,474).” (*Id.* at 3, ¶ 3.) The examiner commented that these claims were rejected because:

It is known in the art in a wafer test using a spiral scan to measure not only scattered light but reflected light as well; see Jann et al., which detects Scattered light using [a] detector ... and reflected light using [another] detector It would have been obvious to use in the apparatus of Jann et al a small “sub-scan” as taught by Yoshii et al to improve the detection of small particles in the manner taught by Yoshii et al.

(*Id.*)

Claims 22-27, 32, 34, 36, and 39 were also rejected pursuant to Section 103(a) as “unpatentable over Yoshii et al (US 5,461,474) in view of Steigmeier et al (US 4,314,763).”

(*Id.* at 1, ¶ 2.) As to these claims, the examiner commented:

Yoshii et al teaches that the detection of foreign matter on the surface of an object in a two-dimensional scanning system can be enhanced by “sub-scanning” the scanning beam by a small amount as it scans the wafer. Yoshii et al teaches that this “sub-scanning” can be performed by the use of an acousto-optic deflector; see figure 9 of the reference, for example.

While Yoshii et al shows this technique being used with a scanning system in a orthogonal scanning pattern which the scan in one direction is accomplished by scanning the light beam and the other direction by moving the object being scanned, it would have been obvious that this technique would be equally as useful with other known means of accomplishing a scan, including the known spiral scan system of the sort taught by Steigmeier et al.

(*Id.*)

The examiner then provided the applicants with some remarks. (*Id.* at 3-5, ¶¶ 4-9.) In particular, the examiner stated that “[t]he art does not appear to teach adjusting the speed of the scanning system to maintain a constant scan speed ... [and] [t]he art does not

appear to the us [sic] of a dark channel detector comprising a plurality of collectors ... to detect light at different predetermined angles, in particular both forwardly and backwardly scattered light, nor, in combination, normally scattered light.” (*Id.* at 3-4, ¶¶ 4-5.)

On August 2, 1996, the applicants, responded to the examiner’s rejections. (*Id.* at ‘701 Patent Prosecution File History, Applicants’ Response to Office Action mailed Mar. 4, 1996.) As to claims 22, 27, 32, and 39, the applicants stated that these claims:

[C]laim a machine or process that scan each portion of the workpiece surface. The acousto-optical deflector provides a narrow subscan that, coupled with a spiral scan path, covers the entire workpiece surface. This subscan allows the use of a small spot size to increase the sensitivity and spatial resolution of the scan, while maintaining rapid scan coverage of the entire surface of the workpiece. Thus, the invention provides high spatial resolution, complete coverage of the workpiece surface, and high throughput. Previous surface inspection systems could maximize high spatial resolution (but with a lower throughput or incomplete coverage) or maximize throughput or coverage (but at a lower sensitivity because of the use of a larger spot size). Before this invention, however, no surface inspection system was able to maximize all three criteria.

(*Id.* at 1-2.) The applicants further stated that the prior art does not “suggest a way to adjust for the change in orientation relative to the light beam[]” created when a subscan of a workpiece is performed along a spiral scan pattern. (*Id.* at 2-3.) The applicants then commented that the prior art, unlike their invention, “fails to teach or suggest a scanning system ... that maximizes all three critical criteria, high spatial resolution, complete coverage of the workpiece, and high throughput.” (*Id.* at 3.)

As to claims 1-5, the applicants responded:

Claims 1-5 were rejected as being obvious to use a spiral scan as taught by Jann with a small subscan as taught

by Yoshii to improve the detection of small particles in the manner taught by Yoshii Yoshii does not teach how to incorporate a Yoshii-type subscan into a spiral scan pattern as taught by Jann. In addition, the multiple subscans taught in Yoshii result in reduced throughput. Jann also fails to teach how to incorporate a subscan into its spiral scanning surface inspection system.

In contrast, the present invention teaches a single scan over each area of the wafer. The subscan permits the use of a small spot size for high resolution of artificial defects, while maintaining complete scanning of the wafer surface and high throughput. The present invention does not use multiple scans of the same area of the wafer, nor does the present invention use any type of correlation analysis

(*Id.* at 3-4.) In response to the rejection of claims 22-27, 32, 34, 36, and 39, the applicants argued:

Steigmeier describes a typical spiral scanning system that provides complete coverage of the wafer surface. Stiegmeier, however, does not teach any method of improved spatial resolution or increased throughput, and fails to suggest a method for introducing a subscan to a system providing a spiral surface scan of a workpiece.

(*Id.* at 3.)

On October 23, 1996, an examiner issued a Final Office Action allowing claims 8-21, 28-31, 33, 37, 38, and 40-44; rejecting claims 1-5, 22-27, 32, 34, 36, and 39; and objecting to claims 6, 7, and 35. (*Id.* at '701 Patent Prosecution File History, Final Office Action mailed Oct. 23, 1996 at 1-2.) The examiner further specified that claims 1-5, 22-27, 32, 34, 36, and 39 were again rejected under Section 103(a) as unpatentable given the prior art. (*Id.* at 2-3, ¶¶ 2-3.) With regard to claims 1-5, the examiner reiterated that those claims were “unpatentable over Jann et al (US 5,189,481) in view of Yoshii et al (US 5,461,474).” (*Id.* at 3, ¶ 3.) The examiner commented:

It would have been obvious to use in the apparatus of Jann et al a small “sub-scan” as taught by Yoshii et al to improve the detection of small particles in the manner taught by Yoshii et al.

(*Id.*) The examiner then provided the applicants with more remarks. (*Id.* at 3-6, ¶¶ 4-10.)

The examiner first noted that the applicants’ statement “that the system of Yoshii et al would not work with a spiral scan does not appear correct[] [because] ... any changes in orientation that may occur during the subscan would be negligible.” (*Id.* at 3, ¶ 4.) The examiner then commented that “[t]he rejected claims call for scanning systems with a main scan and a smaller subscan; this is taught by Yoshii et al.” (*Id.* at 4, ¶ 5.) The examiner restated that “the art does not appear to teach adjusting the speed of the scanning system to maintain a constant scan speed ... [and] the art does not appear to the us [sic] of a dark channel detector comprising a plurality of collectors ... to detect light at different predetermined angles, in particular both forwardly and backwardly scattered light, nor, in combination, normally scattered light.” (*Id.* at 3-5, ¶¶ 4, 6.)

On January 20, 1997, the applicants amended their application consistent with the examiner’s Final Office Action. (*Id.* at ‘701 Patent Prosecution File History, Amendment After Final dated Jan. 20, 1997.) Claim 1 was amended to add, as elements of the claim, a light channel detector and a dark channel detector. (*Id.* at 1-2.) Claim 22⁸ was amended to include a “means for varying the speed of rotating the workpiece ... during the scan ... so as to provide substantially constant scanning speed of the surface of the workpiece.”

⁸Application claim 22 is numbered as claim 21 in the ‘701 patent.

(*Id.* at 2.) Claim 32⁹ was amended to add the step of “separately collecting light specularly reflected from and light scattered from the surface of the workpiece” (*Id.* at 3.)¹⁰

Thereafter, on February 4, 1997, pursuant to the applicants’ January 20, 1997 amendments, an examiner allowed claims 1-5, 7-32, and 34-44. (*Id.* at ‘701 Patent Prosecution File History, Notice of Allowability mailed Feb. 4, 1997.) The ‘701 patent issued on January 27, 1998.

2. The ‘525 Prosecution History

The ‘525 patent is entitled “Wafer Inspection System for Distinguishing Pits and Particles.” Michael E. Fossey, John C. Stover, and Lee D. Clementi¹¹ are the named inventors. Independent claim 1 of the patent is representative of the invention:

1. A surface inspection method for distinguishing between particle defects and pit defects on a surface of a workpiece, said method comprising:
 - receiving the workpiece at an inspection station;
 - scanning the surface of the workpiece at the inspection station with a beam of P-polarized light at an angle of incidence oblique to the workpiece surface;
 - collecting light scattered from the surface of the workpiece at the inspection station at a first central zone, and at least at a second oblique zone offset angularly from said first zone;
 - converting the collected light components from said zones into respective signals representative of light scattered into said zones;
 - comparing said signals; and

⁹Application claim 32 is numbered as claim 31 in the ‘701 patent.

¹⁰The applicants made additional amendments to the claims consistent with their amendments of claims 1, 22, and 32. See *id.* at 1-6.

¹¹Lee D. Clementi was added as an inventor via a Petition to Correct Inventorship pursuant to 37 C.F.R. § 1.48(a). (D.I. 627 at ‘525 Patent Prosecution File History, Petition to Correct Inventorship dated May 10, 1999.)

determining whether a defect is one of a pit and a particle based at least on said comparing.

(D.I. 627, '525 Patent Prosecution File History, '525 Patent at col. 12 ll. 19-36.)

The patent application leading to the '525 patent was originally filed with 29 claims. (See *id.* at '525 Patent Prosecution File History, Application Serial No. 08/958,230.) In an Office Action mailed June 5, 1998, an examiner at the PTO rejected each of the applicants' claims pursuant to 35 U.S.C. § 103(a) "as being unpatentable over Quackenbos et al (4794264) in view of Wells et al (5355212)." (*Id.* at '525 Patent Prosecution File History, Office Action mailed June 5, 1998 at 1-3.) The examiner explained that Quackenbos teaches using a light beam from any known source to scan the surface where "[t]he perpendicular scattered light, caused by pits ... [are] detected by [the item designated as "28" in the Quackenbos patent] and the other scattering angles, both back scattered light and forward scattered light, ... is detected using [a] sensor [designated as item "48" in the Quackenbos patent]." (*Id.* at 3.) The examiner noted that Quackenbos compares the intensity of the light in these sensed regions to determine whether there is a pit or a particle on the surface and it maps the location of the pits. (*Id.*) However, Quackenbos did not teach "the use of a laser scanning at an angle of the surface, and the use of the system to distinguish and map both the flaws, being either a pit or particle." (*Id.*)

The examiner next turned to the Wells patent, explaining that Wells, like Quackenbos, teaches the use of a light beam to scan a wafer surface. (*Id.*) The perpendicularly and other angularly scattered light is then collected and analyzed to "map the surface of the wafer ... for defects (pits, scratches, etc..), particles, and patterns of the

wafer. The system can be used to determine ... the sensing of a defect/particle ... either a pit or particle.” (*Id.* at 3-4.) The examiner then commented that:

[I]t would have been obvious to an artisan at the time ... to employ a notoriously old and well known use of a scanning laser system which irradiated the surface at an angle, and a system which no [sic] only detects the surface for both pits and particles, but maps both ... where the combination of the teachings would provide an overall system which would combine two necessary determinations and methods into one by detecting the different scattering angles off a surface, comparing the scattering intensities to each other or thresholds, and mapping the surface of a wafer for both the unique features found, pits and particles

(*Id.* at 4.)

On August 26, 1998, the PTO received the applicants’ response to the examiner’s June 5, 1998 Office Action. (*Id.* at ‘525 Patent Prosecution File History, Applicants’ Response to Office Action mailed June 5, 1998.) In their response, the applicants first gave a description of their invention, stating:

[T]he apparatus and methods of the invention employ a plurality of collectors arranged at different angular positions relative to the workpiece for collecting back-scattered, forward-scattered, and perpendicularly scattered light. ... By comparing the light intensity in the center region to the light intensity in the backward and/or forward regions, a defect can be classified as either a pit or a particle.

* * *

As further explained below, both Quackenbos and Wells wholly fail to teach or even remotely suggest the importance of ... collecting scattered light in the backward, center, and forward-scattered regions, and comparing the intensities in these three regions to discriminate pits from particles.

(*Id.* at 2-3.)

In a further effort to distinguish their invention, the applicants repeated that Quackenbos “does not separately collect back-scattered and forward-scattered light, nor does he compare the intensities of scattered light in different regions in order to discriminate a pit from a particle.” (*Id.* at 5.) Moreover, asserted the applicants,

[In Quackenbos] there are not truly any “back-scatter” or “forward-scatter” directions. Rather, light is scattered by a defect in a conical volume Thus, it is clear that Quackenbos, ... does not separately collect back-scattered and forward-scattered light. Moreover, he does not compare two detected intensities, but merely detects whether signals are present on the near-specular and far-specular sensors.

Additionally, Quackenbos does not disclose how the near-specular and far-specular sensors should be arranged if, as suggested at column 3, lines 56-58, the incident light beam can be directed non-perpendicular to the surface. The disclosure wholly fails to teach or suggest that non-perpendicular incidence is preferable, and does not even recognize that non-perpendicular incidence can give different results in terms of the angular distribution of scattered light.

In short, Quackenbos completely fails to teach or suggest the important aspects of Applicants’ invention, namely, that ... scattered light should be collected in backward, center, and forward regions, and that the intensities in these regions should be compared in order to discriminate pits from flaws.

(*Id.* at 5-6.) As to Wells, the applicants remarked, “Wells collects scattered light at only two locations neither of which is positioned in the back-scatter region.” (*Id.* at 6.)

With this backdrop, the applicants went on to argue that their original claims 1 and 12 were patentable because, “[n]either of the references teaches or suggests comparing scattered light intensities in different angular locations.”¹² (*Id.* At 7.) Moreover asserted the applicants:

¹²Original claims 1 and 12 were never allowed by the PTO.

[N]either reference teaches or suggests the additional recitation of claim 12 which recites a center channel collector for collecting perpendicularly scattered light and a back channel collector for collecting back-scattered light, and a comparer for comparing the signals from the center and back channel collectors. As noted, neither Quackenbos nor Wells separately collects back-scattered light.

(Id. at 7-8.)

In a later Office Action, mailed November 10, 1998, an examiner at the PTO stated that the applicants' foregoing arguments with respect to claims 1-29 were considered but were moot since the claims were unpatentable under Section 103(a) "over Fossey et al. (WO-96/27786) in view of Well's (5,355,212)." (*Id. at '525 Patent Prosecution File History, Office Action mailed Nov. 11, 1998 at 1-4.*) The applicants responded to the examiner's November 10, 1998 Office Action by adding new claims 30-51, amending the specification to convert the application into a continuation-in-part application, stating that the examiner's Fossey et al. (WO-96/27786) reference could not constitute prior art because it is one of the applicants' own publications, and stating that "[t]he Wells patent fails to teach the claimed invention." (D.I. 627, '525 Patent Prosecution File History, Applicants' Response to Office Action mailed Nov. 11, 1998 at 6-8.) That is so, asserted the applicants, because "no effort is made [in Wells] to compare scattered light intensities in different angular locations so as to discriminate one type of defect from another." (*Id. at 8.*)

By Office Action mailed on October 28, 1999, an examiner rejected claims 1-51 "under 35 U.S.C. 103(a) as being unpatentable over Orazio et al. (5,032,734) in view of Hayano et al. (4,966,457)." (*Id. at '525 Patent Prosecution File History, Office Action mailed Oct. 28, 1999 at 3.*) The examiner explained that "Orazio disclosed an apparatus

for detecting the defects on worksurfaces [sic] by observing the scattered light beams[] [and explains] ... the physical behavior of either P-polarized light beam or the S-polarized light beam. ...” (*Id.*) The examiner then stated that although Orazio fails to teach two detectors at different angles, “Hayano implements at least two set[sic] of detecting devices in order to maximize the detection of scattered lights.” (*Id.* at 3.)

On January 26, 2000, the applicants responded to the examiner’s October 28, 1999 Office Action with argument, cancelled claims 1-51, and added new claims 52-72. (*Id.* at ‘525 Patent Prosecution File History, Applicants’ Response to Office Action mailed Oct. 28, 1999.) New claim 52, which became independent claim 1 of the ‘525 patent, contains the step of “collecting light scattered from the surface of the workpiece at the inspection station at a first *central zone*, and at least a second *oblique zone* offset angularly from said first zone.”¹³ (*Id.* at 1 (emphasis added).) The sole explanation given by the applicants for the new language “central zone” and an “oblique zone” is that an examiner “viewed it favorably” at an interview dated October 27, 1999. (*Id.* at 4.)

Thereafter, on March 28, 2000, an examiner allowed claims 52-72. (*Id.* at ‘525 Patent Prosecution File History, Notice of Allowability mailed Mar. 28, 2000.) The ‘525 patent issued on September 12, 2000.

3. The ‘259 Prosecution History

The ‘259 patent is entitled “Wafer Inspection System For Distinguishing Pits and Particles.” The named inventors are Michael E. Fossey, John C. Stover, and Lee D.

¹³It appears that this is the first place in the ‘525 Prosecution History File that the phrases “central zone” and “oblique zone” appear. The phrases are not used in the ‘525 written description or drawings.

Clementi.¹⁴ Claim 1, which has already been quoted, *supra* at 4, is representative of the invention.¹⁵ By Office Action dated March 23, 2001, an examiner rejected the claims of the patent application (patent application Serial No. 09/624,502) that ultimately led to the '259 patent, stating that, under Section 103(a), they were "unpatentable over Nikoonahad et al (U.S. 5,883,710)." (D.I. 627, '259 Patent Prosecution File History, Office Action dated Mar. 23, 2001 at 3.) The examiner explained that Nikoonahad teaches a surface inspection system that scans the surface of a workpiece with a light beam at an oblique angle of incidence to the workpiece surface and collects the scattered light in four different collectors which "provide output signals to a processor to detect and analyze the characteristics of anomalies." (*Id.*) The examiner did note that "Nikoonahad does not disclose expressly a converter, a comparator, a classifier, and a system controller with a video-display." (*Id.*) But, the examiner said, these elements "do not differentiate the claimed apparatus from the apparatus of Nikoonahad... ." (*Id.*)

On May 16, 2001, the PTO received the applicants' response to the examiner's March 23, 2001 Office Action. (*Id.* at '259 Patent Prosecution File History, Applicants' Response to Office Action dated Mar. 23, 2001.) In their response, the applicants added

¹⁴Lee D. Clementi was added as an inventor by a Petition to Correct Inventorship pursuant to 37 C.F.R. § 1.48(a). (D.I. 627 at '259 Patent Prosecution File History, Petition to Correct Inventorship dated May 16, 2001.) An examiner approved the addition by Office Action. (*Id.* at '259 Patent Prosecution File History, Office Action mailed June 8, 2001.) Mr. Clementi is not named as an inventor on the cover page of the '259 patent submitted to the Court.

¹⁵Upon filing the application leading to the '259 patent, the applicants cancelled claims 1-29 and added claims 30-71. (D.I. 627 at '259 Patent Prosecution File History, Preliminary Amendment dated July 24, 2000.) On December 19, 2000, an examiner at the PTO allowed claims 30-71. (*Id.* at '259 Patent Prosecution File History, Notice of Allowability dated Dec. 19, 2000.) Thereafter, on February 1, 2001, the applicants reopened prosecution by filing a Request for Continued Examination under 37 C.F.R. § 1.114. (*Id.* at '259 Patent Prosecution File History, Request for Continued Prosecution dated Feb. 2, 2001.) The Court's discussion of the '259 patent prosecution history begins after the applicants reopened prosecution.

new claims 72-76, amended claims 30, 34-39, 41, 50, 52-54, 55, 59, 61, and 62, and attempted to distinguish their invention from the Nikoonahad patent. (*Id.* at 1-17.) Specifically, the applicants amended many of the claims to include the phrase “the collected light components are converted into respective intensity signals representative of the intensity of the light scattered into the *central zone* and *oblique zone*.” (See, e.g., *id.* at 13, amended claim 37 (emphasis added).) Again, as in the ‘525 patent application process, addition of the “central zone” and “oblique zone” language was made at the end of patent prosecution and the phrases are not used in the written description or drawings.

On June 5, 2001, an examiner allowed claims 30-76. (*Id.* at ‘259 Patent Prosecution File History, Notice of Allowability mailed June. 5, 2001.) The ‘259 patent issued on September 18, 2001.

III. CLAIM CONSTRUCTION

A determination of patent infringement involves two steps. First, the patent claims are construed, and, second, the claims are compared to the allegedly infringing device. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1455 (Fed. Cir. 1998) (en banc). Claim construction is a matter of law for the Court. *Markman*, 52 F.3d at 979. “To properly construe the claims, a court must examine the claims, the rest of the specification, and, if in evidence, the prosecution history.” *Amgen Inc. v. Hoechst Marion Rousell, Inc.*, 314 F.3d 1313, 1324 (Fed. Cir. 2003). The process begins, however, with the language used in each claim itself. See, e.g., *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). It is that language that defines and measures the scope of a patented

invention. See, e.g., *SRI Int'l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc).

If possible, claim language is given the ordinary and accustomed meaning understood by practitioners in the art. *Hockerson-Halberstadt, Inc. v. Avia Group Int'l, Inc.*, 222 F.3d 951, 955 (Fed. Cir. 2000). There is a “heavy presumption” that, if such a meaning exists, it is the meaning intended. *Bell-Atl. Network Servs., Inc. v. Covad Commuincations Group, Inc.*, 262 F.3d 1258, 1268 (Fed. Cir. 2001). That presumption does not control, however, when the inventor deviates from the ordinary and accustomed meaning by acting as a lexicographer¹⁶ or when the ordinary and accustomed meaning would deprive the claim, as a whole, of an ascertainable meaning. *Id.* The intrinsic record before the court, therefore, “must be examined in every case to determine whether the presumption of ordinary and customary meaning is rebutted.” *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 1204 (Fed. Cir. 2002). If there is no clear, ordinary and customary meaning in the claim language, then consideration of the rest of the intrinsic evidence is directed to resolving, if possible, the lack of clarity. *Interactive Gift Express, Inc. v. CompuServe Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001).

If the meaning of a claim term remains unclear after considering the intrinsic evidence, a court may enlist the aid of extrinsic evidence “to help resolve the lack of clarity.” *Interactive Gift*, 231 F.3d at 1332; see also *Mannington Mills, Inc. v. Armstrong*

¹⁶There is a long-standing principle in patent law that an inventor may define his invention in terms he deems fit, so long as the meaning of the words are clearly discernible from the disclosure. See, e.g., *W.L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, cert. denied, 469 U.S. 851 (1984). Inventors are thus held only to the standard of “particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.” 35 U.S.C. § 112, ¶ 2; see also *In re Pilkington*, 411 F.2d 1345, 1349 (C.C.P.A. 1969 (“[I]t appears that appellant has distinctly pointed out and claimed what he regards as his invention.”)).

World Indus., Inc., 218 F. Supp. 2d 594, 598 (D. Del. 2002) (“When the extrinsic record can provide a meaning eluding the court’s grasp, a court should adopt such a construction if that construction is cognizant with the overall intrinsic record before it.”) (citing *Vitronics*, 90 F.3d at 1583). Use of extrinsic evidence, however, is restricted. “Relying on extrinsic evidence to construe a claim is ‘proper only when the claim language remains genuinely ambiguous after consideration of the intrinsic evidence.’” *Interactive Gift*, 231 F.3d at 1332. Extrinsic evidence may not “contradict the import of other parts of the specification [or intrinsic record]. Indeed, where the patent documents are unambiguous, expert testimony regarding the meaning of a claim is entitled to no weight.” *Id.* Neither are inventors entitled to an after-the-fact claim construction inapposite to the “clear import of the patent disclosure itself.” *North Am. Vaccine, Inc. v. Am. Cyanamid Co.*, 7 F.3d 1571, 1577 (Fed. Cir. 1993), *cert. denied*, 511 U.S. 1069 (1994).

Further, amendments or cancellations of claims as well as arguments or other statements made during prosecution of earlier filed applications in a chain of continuing applications may limit construction of claims in later filed continuing applications if there exists a nexus between those earlier statements and the later filed claims. *See Augustine Medical, Inc. v. Gaymar Industries, Inc.*, 181 F.3d 1291, 1300 (Fed. Cir. 1999) (cancelling or amending all original claims in an earlier application in favor of new claims to traverse an examiner’s rejection evidenced a narrowing of claim coverage); *Mark I Mktg. Corp. v. R.R. Donnelley & Sons Co.*, 66 F.3d 285, 291-92 (Fed. Cir. 1995), *cert. denied*, 516 U.S. 1115 (1996) (amending original claims in a series of continuation-in-part applications to gain allowance by making them narrower evidenced a surrender of claim scope); *Jonsson*,

903 F.2d at 818 (holding that the prosecution history and construction of the term in a parent application was relevant to construing the same term in a patent issued on a continuation-in-part application based on the parent application).

The terms at issue in the '259 patent are as follows: "oblique zone," "scan," "scanner," "scan a surface of the workpiece," "collector," "scattered from the surface of the workpiece," "one or more converters," "substantially only backscattered light," "predetermined value," "predetermined measure," "threshold value," "determines the size of the pits and particles," "groups the pits and particles based at least in part on the determination of size," "map," "system controller," "comparator," "classifier," and "sorts the workpieces." Following is the Court's construction of each of those terms.

A. "oblique zone"¹⁷

A suggested construction of the phrase "oblique zone" was given by the magistrate judge in addressing the related phrase, "a second oblique zone offset angularly from said first zone," which is found in the '525 patent. *ADE Corp.*, 220 F. Supp. 2d at 315-19. Pursuant to Federal Rule of Civil Procedure 72, ADE has objected to the recommendation of the magistrate judge on that point.¹⁸ (D.I. 533 at 15-22.) KLA, of course, urges the Court to adopt the construction suggested by the magistrate judge. (D.I. 615 at 1-12.) The Court takes this opportunity to deal with the term "oblique zone" as used in the '259 patent to simultaneously address ADE's objection to the magistrate judge's recommendation

¹⁷The phrase "oblique zone" is used in claims 1, 5, 6, 8, 9, 10, 21, 23, 24, 25, 29, 30, 32, and 33 of the '259 patent.

¹⁸Since patent claim construction is a question of law under *Markman*, even though not case dispositive, the magistrate judge's opinion is subject to plenary review. See, e.g., *Haines v. Liggett Group, Inc.*, 975 F.2d 81, 91(3d Cir. 1992) (district court exercises plenary review of magistrate judge's rulings of law).

regarding the related phrase in the '525 patent. The following analysis is thus based not only on the parties' submissions with respect to the '259 patent but also on a *de novo* review of the evidence and arguments presented to the magistrate judge with respect to the phrase "second oblique zone offset angularly from said first zone" as found in the '525 patent claims.

The magistrate judge observed that the phrase "second oblique zone offset angularly from said first zone" first appeared in the prosecution history of the '525 patent "after being added almost two years into prosecution." *Id.* at 317. Although ADE argued that the inventors did not intend for the phrase to have a specialized meaning and that "those skilled in the art would readily comprehend what is meant[,]” *id.*, ADE was unable to offer any pertinent art reference that would explain the meaning of the phrase. *Id.* at 317. Instead ADE urged the Court to apply a dictionary definition of "oblique" as modifying a dictionary definition of the word "zone." *Id.*

Turning to the specification and prosecution history of the '525 patent for assistance, the magistrate judge stated that the separate collection of forward, central, and backward scattered light was consistent with the "internal logic" of the '525 patent disclosure and it was also consistent with the applicants' arguments during patent prosecution. *Id.* at 318-19. In light of the record, she construed the phrase "second oblique zone offset angularly from said first zone" to mean "a second collection zone differing in polar angle from the central collection zone that does not collect the same light being collected by the 'central zone' but, instead, collects either forward or backward scattered light but does not collect both simultaneously." *Id.* at 319. The magistrate judge reached that conclusion by

reasoning that, in prosecuting their application, “the inventors predicated patentability on separate collection of forward and/or backward scattered light ... in addition to collection of light scattered generally in the normal direction.” *Id.*

1. ADE’s Position

ADE devoted most of its Opening Claim Construction Brief (D.I. 595) to a discussion of the relevance and importance of the “oblique zone” claim limitation. It argues that Federal Circuit precedent requires the Court to first assess the ordinary meaning of individual claim terms such as “oblique” and “zone” before considering the remainder of the intrinsic record to arrive at a construction for a disputed claim phrase. (*Id.* at 14-16.) According to ADE, the magistrate judge failed to follow that course and was instead persuaded by KLA to read the preferred embodiment of the invention into the construction of “oblique zone,” which “resulted in the incorporation of the extraneous limitation that the oblique zone collects ‘either forward or backward scattered light but does not collect both simultaneously.’” (*Id.* at 16-17.) The correct course, says ADE, is for the Court to consider the dictionary definition of the word “oblique” because it has a plain and ordinary meaning which, when combined with the common word “zone,” gives the phrase “oblique zone” a plain and ordinary meaning as well. (*Id.* at 18-21.) The construction that ADE proposes be adopted would define “oblique zone” as “a light collecting zone positioned to collect light generally scattered obliquely (i.e., neither parallel nor perpendicular to the workpiece surface), and that is offset angularly from the central zone in the polar direction”. (*Id.* at 3.)

ADE also asserts that the doctrine of claim differentiation supports its proposed construction for “oblique zone,” since dependent claims 3, 4, 5, and 6 of the ‘259 patent “specify forward and backward limitations, reinforcing the breadth of claim 1.” (*Id.* at 22.) In other words, ADE contends that since there are dependent claims that do have explicit limitations on the separate gathering of forward and backward scattered light, it is error to read claim 1, from which those later claims depend, to include such a limitation. (*See id.*)

Finally, in an attempt to rebut efforts by KLA to focus the Court’s attention on the prosecution history of the patent, ADE argues that the intrinsic record is not clearly inconsistent with its proposed construction and does not evidence a clear and unambiguous disavowal of claim scope. (*Id.* at 22-27.)

2. KLA’s Position

As earlier noted, KLA asserts that the magistrate judge properly construed the phrase “oblique zone” and, therefore, the construction given the phrase in connection with the ‘525 patent should apply to the ‘259 patent as well.¹⁹ (D.I. 615 at 3.) In support of the approach taken by the magistrate judge, KLA points out that the magistrate judge first concluded that the phrase “oblique zone” has no ordinary or pertinent art meaning before she examined the remainder of the intrinsic record for guidance, all of which was and is consistent with Federal Circuit precedent. (*Id.* at 3-6.) Finally, KLA argues that an independent review of the issue should lead to the same result because the phrase “oblique zone” has no plain and ordinary meaning and, even if it did, the inventors

¹⁹ While it praises the magistrate judge’s opinion on this particular issue, KLA too has filed objections to the opinion (D.I. 531), thus upholding the time-honored tradition of a party’s accepting a court’s conclusions only when they are in full agreement with the party’s own.

restricted the construction of the phrase during patent prosecution, thus showing a clear and unequivocal disavowal of the construction proposed by ADE. (*Id.* at 7-12.)

3. Analysis

The Court rejects ADE's effort to focus attention solely on dictionary definitions. It is true that, in *Texas Digital*, the Federal Circuit retreated from the notion that dictionaries, encyclopedias, and treatises are to be viewed as extrinsic evidence. *Texas Digital*, 308 F.3d at 1203 (“[C]ategorizing them [dictionaries, encyclopedias, and treatises] as ‘extrinsic evidence’ or even a ‘special form of extrinsic evidence’ is misplaced and does not inform the analysis.”). But, regardless of the label applied to those tools of construction, the Federal Circuit had endorsed their use before *Texas Digital*, see, e.g., *Toro Co. v. White Consol. Indus. Inc.*, 199 F.3d 1295 (Fed. Cir. 1999), and *Texas Digital* did not make them the “be all and end all” of claim construction or otherwise work a dramatic change in the process of construing claims. Indeed, the Court in *Texas Digital*, acknowledged that “[i]t has been long recognized in our precedent and in the precedent of our predecessor court, the Court of Customs and Patent Appeals, that dictionaries, encyclopedias and treatises are particularly useful resources to assist the court in determining the ordinary and customary meanings of claim terms.” *Id.* at 1202 (citations omitted). Afterwards, the Court stated that “the intrinsic record may show that the specification uses the words in a manner clearly inconsistent with the ordinary meaning reflected, for example, in a dictionary definition. In such a case, the inconsistent dictionary definition must be rejected.” *Id.* at 1204 (citations omitted). Thus, while dictionaries, encyclopedias, and treatises may be a starting point in the analysis, they are not necessarily the ending point. See *id.* at 1205

(“By examining relevant dictionaries, encyclopedias and treatises ... and by further utilizing the intrinsic record ... unintended limitations from the written description into the claims will be more easily avoided.”).

ADE would have this Court first recite a dictionary definition for each word in a contested patent claim phrase, add those definitions together, and adopt the resulting amalgamation as the Court’s construction before proceeding to any consideration of the remainder of the intrinsic record. The cases cited by ADE, however, do not require the cataloguing of dictionary definitions before construing disputed claim phrases, nor do they require the adoption of a definition equal to the sum of the individual definitions of the words in a contested phrase.

For example, in *Inverness Medical Switzerland v. Princeton Biomeditech Corp.*, 309 F.3d 1365, (Fed. Cir. 2002) (“*Inverness I*”), a case cited by ADE in support of its argument, the parties disputed a claim phrase containing the word, “mobility.” 309 F.3d at 1369. The meaning of that word, reasoned the Court, was not disputed by the parties but was central to the controversy. *Id.* The Court, therefore, looked in a dictionary and chose, of the multiple dictionary definitions of “mobility,” the one most appropriate in view of the intrinsic evidence before the Court. *Id.* at 1369-70. The Court then used that definition in its construction of the remainder of the phrase in which the word appeared. *Id.*

In *Inverness Medical Switzerland v. Warner Lambert Co.*, 309 F.3d 1373 (Fed. Cir. 2002) (“*Inverness II*”), which ADE also cites, the Court “look[ed] ... to the dictionary definitions of the claim terms ‘on’ and ‘onto’ as of the date the patents issued.” 309 F.3d at 1378. Reasoning that the definition of the word “onto” referred to the word “on,” the

Court concluded “that both prepositions are properly addressed through the interpretation of ‘on.’” *Id.* The Court then commented that the word “on” had an ordinary meaning encompassing two applicable dictionary definitions, therefore, the Court had to look to the remainder of the intrinsic record to “determine whether the specification or prosecution history clearly demonstrates that only one of the multiple meanings was intended.” *Id.* at 1378-79 (citing *Renishaw PLC v. Marposs Società per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)). The Court then reversed the lower court for adopting only one of the two applicable meanings because both possible constructions were viable, given the intrinsic record before the Court. *Id.* at 1379-82.

Similarly, in *Schumer v. Lab. Computer Sys., Inc.*, 308 F.3d 1304 (Fed. Cir. 2002), the Court held that the lower court’s “construction contradicts the plain meaning of the word ‘or’ in the claims.” 308 F.3d at 1311. The Court then looked to a dictionary to define this ordinary word and compared that definition to the intrinsic record and held that the intrinsic record did not compel a construction different from the ordinary meaning of the word. *Id.* at 13-14.

Therefore, in contrast to what ADE seems to urge, the case law demonstrates that claim construction does not conclude with the shutting of a dictionary. If a court opts to use a dictionary when construing claims, it must still proceed to a consideration of remaining claim language and the remainder of the intrinsic record to determine whether the disputed claim language is used consistently with any ordinary meaning the claim language may have. A narrow approach to patent claim construction that focuses on summing dictionary definitions may well lead a court to adopt an inappropriate construction, one that is

inconsistent with the pertinent art and the intrinsic record of the patent in suit. That danger is exacerbated when a phrase, rather than a single word, is at issue. The meaning of a phrase is often greater than the sum of the individual words. Ordinary experience with idiomatic phrases, particularly when translating them from one language to another, demonstrates the difficulties and misunderstandings that a literal, word-for-word translation can produce. A dictionary, encyclopedia, or treatise may also contain several definitions for the same word. In short, context is critical, and the import of the intrinsic record cannot be ignored. See *Springs Window Fashions, LP v. Novo Indus., L.P.*, Nos. 02-1309, 02-1347, 2003 WL 297500, *4 -*6 (Fed. Cir. Feb. 13, 2003) (noting that a patentee is held to what was said during patent prosecution when distinguishing prior art even though there is no explanation in the prosecution history for particular claim language because competitors must be able to look to the intrinsic record and rely upon it).

As previously noted, *supra* at 23-25, the magistrate judge reviewed the phrase “oblique zone” as part of the larger phrase “second oblique zone offset angularly from said first zone.” ADE asserts that the magistrate judge read a limitation into the construction of “oblique zone” from the preferred embodiment. (D.I. 595 at 16-17.) In fact, however, the magistrate judge merely acknowledged the difficulties in construing the phrase “oblique zone,” stating that the Court was “well aware ... that a preferred embodiment does not, necessarily, define the claimed invention as detailed by the language of the claims.” *ADE Corp.*, 220 F. Supp. 2d at 318. The magistrate’s Report and Recommendation went on to reason, in effect, that the phrase “oblique zone” was not clear on its face and that the inventors had failed to provide clues to its correct interpretation except through the intrinsic

record and whatever further understanding could be gleaned from the description of the preferred embodiment. *Id.* at 318-19 (citations omitted). That conclusion about the phrase in the '525 patent is sound and is equally true with regard to the term "oblique zone" as used in the '259 patent. *Cf. Schumer*, 308 F.3d at 1312 ("It is well established that statements made during prosecution are used to interpret the scope and meaning of ambiguous claim terminology.") (citing *Vitronics*, 90 F.3d at 1582); *E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1438 (Fed. Cir. 1988), *cert. denied*, 488 U.S. 986 (1988) ("[A]rguments made during prosecution history are relevant in determining the meaning of the terms at issue. Those arguments ... must be examined to ascertain the true meaning of what the inventor intended to convey in the claims.") (citations omitted); *ZMI Corp. v. Cardiac Resuscitator Corp.*, 844 F.2d 1576, 1580 (Fed. Cir. 1988), *aff'd*, 899 F.2d 1228 (1990) (rejecting patentees' proposed construction of disputed claim term as inconsistent with prosecution history).

The phrase "oblique zone" was first added to the claims of the '525 patent by amendment after an interview with a PTO examiner. (D.I. 627, '525 Patent Prosecution File History, Applicants' Response to Office Action mailed Oct. 28, 1999 at 4.) Under 37 C.F.R. § 1.133(b), it is the patentee's responsibility to complete a written statement as to the substance of that interview. *See also* 37 C.F.R. § 1.2; Manual of Patent Examining Procedure § 713.04 pp. 700-166 to 700-168 (8th ed., Aug. 2001). Failure to adequately explain why an examiner approved of that language does not erase the preceding prosecution history, which includes prior art citations that the examiner viewed as rendering the invention obvious. *See Tate Access Floors, Inc. v. Interface Architectural Res., Inc.*,

279 F.3d 1357, 1372 n.4 (Fed. Cir. 2002) (prior art cited by an examiner in the prosecution history is part of the intrinsic record of the patent). That prosecution history clearly weighs against the interpretation sought by ADE.

In an Office Action mailed June 5, 1998, an examiner at the PTO rejected the applicants' original claims in the application leading to the '525 patent because, as written, those claims were obvious under Section 103(a). (D.I. 627 at '525 Patent Prosecution File History, Office Action mailed June 5, 1998 at 1-3.) Specifically, the examiner explained that a particular prior art reference known as "Quackenbos" made the claimed invention obvious:

Quackenbos teach [sic] of using a light beam ... to send light to surface ... of a disk ... which is moved and rotated ... to scan the entire surface in two directions. The perpendicular scattered light, caused by pits ... is detected ... and the other scattering angles, both back scattered light and forward scattered light ... is detected using [a] sensor The two detected intensities are compared in [a] comparator ... and then the system determines if the sensed region is a particle or pit where only the pits on the surface are mapped

(*Id.* at 3.) The examiner then explained that another prior art reference called "Wells" could, like the applicants' invention and unlike the Quackenbos reference, "be used to determine ... the sensing of a defect/particle ... either a pit or particle[,] thus, rendering the applicants' invention obvious in light of the combination of those two references. (*Id.* at 3-4.)

There is little question from the quoted remarks that the examiner understood the pertinent art as disclosing a system that employs two detectors in which normally (or perpendicularly) scattered light is collected in one sensor and, in the other sensor, both

forward and backward scattered light are collected for detecting defects on the surface of a silicon wafer or other workpiece. In Quackenbos, as depicted below in Figure 3 from that patent, the two sensors are conically shaped and depicted as item 28, which is capable of collecting perpendicularly scattered light, and as item 48, which is capable of collecting forward scattered light, back scattered light, and other light scattered in a 360 degree azimuthal range.

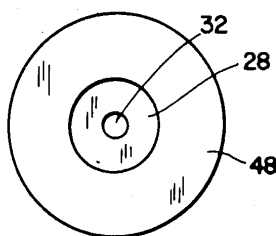


Fig. 3

(D.I. 626 at U.S. Patent No. 4,794,264 (issued Dec. 27, 1988), Figure 3.)

On August 26, 1998, the PTO received the applicants' response to the examiner's June 5, 1998 Office Action. (D.I. 627 at '525 Patent Prosecution File History, Applicants' Response to Office Action mailed June 5, 1998.) In that response, the applicants twice distinguished their invention from the Quackenbos reference by stating that "Quackenbos ... does not separately collect back-scattered and forward-scattered light. ..." (*Id.* at 5 (emphasis in original).) The applicants also characterized their invention as employing "a plurality of collectors arranged at different angular positions ... for collecting back-scattered, forward-scattered, and perpendicularly scattered light." (*Id.* at 2.) In addition, the applicants asserted that in Quackenbos "there are not truly any 'back-scatter' or 'forward-

scatter' directions. Rather, light is scattered by a defect in a conical volume." (*Id.* at 5.) After making the foregoing statements with regard to their invention and the prior art, the applicants proceeded to a discussion of original claims 1 and 12.²⁰ (*Id.* at 7.) As to those two claims, the applicants argued that neither Quackenbos nor Wells teaches or even suggests the additional recitation in claim 12 of separately collecting perpendicularly and back-scattered light. (*Id.* at 7-8.) Moreover, asserted the applicants, "[n]either of the references teaches or suggests comparing scattered light intensities in different angular locations." (*Id.*) The applicants thus predicated the patentability of their invention on the separate collection of forward, backward, and perpendicularly scattered light.

In addition to the prosecution history that weighs heavily against ADE's proposed construction, there is a significant question as to whether the invention would be enabled if ADE's construction of "oblique zone" were adopted. Figure 16 and column 12 lines 19-36 of the '259 patent written description disclose a mathematical algorithm for comparing the center channel signal to either or both of the forward channel signal or the back channel signal.²¹ This signal comparison algorithm is suited for comparing signals generated from forward, backward, and center "segmented" collection/detection apparatuses. The algorithm is not designed to process light signals produced from a center collection/detection apparatus and a single axisymmetric collection/detection apparatus that collects both forward and backward scattered light in a 360 degree azimuthal range.

²⁰ See *supra* note 12.

²¹ See *supra* note 5.

Granted, the mathematical algorithm taught by the inventors is qualified by the following language in the specification:

It should be apparent to those of skill in the art from this illustration that the present invention is not limited to the particular algorithm described herein, and that other approaches and other specific algorithms may be used to process the data obtained from the various detectors and to distinguish between pits and particles *in accordance with the present invention*.

(D.I. 627, '259 Patent Prosecution File History, '259 Patent at col. 12 ll. 43-49 (emphasis added).) The Court is bound by what is disclosed. Those of ordinary skill in the art may be able to conceive of different algorithms to use in the '259 invention, however, those algorithms must work in accordance with the disclosed invention, which processes distinct signals gathered from separate collectors. (*Id.*)

The disclosed algorithm processes signals from three different sources, a forward channel collector/detector, a back channel collector/detector, and a center channel collector/detector. An algorithm that can process separate signals for comparison is, it would seem, a much different endeavor than a mathematical algorithm that can be used to analyze a single signal representing light collected in a forward and backward scatter region generated by a single collector/detector and then compare the scattered light pattern of the forward and backward scattered light to the light collected in a central region to determine whether the collected light in those regions is characteristic of a pit or particle defect. Such an algorithm, one capable of processing axisymmetric collected light, would be required to render the invention operable if ADE's construction of "oblique zone" was adopted by the Court, since ADE's construction would permit collection of forward and

backward scattered light in one collector/detector positioned to collect light 360 degrees in the azimuthal range. There is, however, no disclosure in the '525 or '259 written descriptions or drawings supporting such an algorithm.

If the argument were made that the algorithm need not differentiate between forward and backward scattered light collected in a single apparatus because that is accomplished by the apparatus which collects the light from the two regions, then the '259 and '525 inventions do not teach a single collector/detector for capturing forward and backward scattered light and do not enable a single collector/detector that can perform such a function. Yet ADE's proposed construction of "oblique zone" would encompass just such a single conical or axisymmetric collector/detector, capable of capturing forward and backward scattered light and comparing the forward and backward collected light to light collected in a center channel collector/detector. Again, there is no teaching in the '525 or '259 written descriptions or drawings for such a device. ADE's proposed construction of "oblique zone" is simply not supported by the '525 or '259 intrinsic record before the Court. Indeed, as noted by ADE's efforts to distinguish Quackenbos and Wells, the record is contrary to ADE's position.

ADE, though, points to dependent claims 3, 4, 5, and 6 of the '259 patent in support of its argument for a broad construction of the phrase "oblique zone." ADE argues that the doctrine of claim differentiation requires the broader interpretation of claim 1 that it seeks. (D.I. 595 at 22.) The argument, however, ignores the Federal Circuit's warning that, "[t]he dependent claim tail cannot wag the independent claim dog." *North Am. Vaccine, Inc.*, 7 F.3d at 1577. Again, ADE's proposed construction of "oblique zone" was

“disclaimed” by the inventors during patent prosecution in their effort to distinguish the Quackenbos and Wells references cited by the examiner. (See, e.g., D.I. 627 at ‘259 Patent Prosecution History, Applicants’ Response to Office Action mailed June 5, 1998 at 2-3 (“Quackenbos and Wells wholly fail to teach or even remotely suggest the importance of ... collecting scattered light in the backward, center, and forward-scattered regions, and comparing the intensities in these three regions to discriminate pits from particles.”).)

The Court, therefore, adopts the magistrate judge’s construction of “oblique zone” and will also apply it to the claims of the ‘259 patent. Accordingly, “oblique zone” means a collection zone that differs in polar angle from the central collection zone and that does not collect the same light being collected by the central zone but, instead, collects either forward or backward scattered light but does not collect both simultaneously. ADE’s objection to the magistrate judge’s construction of “second oblique zone offset angularly from said first zone” in the ‘525 patent is overruled.

B. “scan,” “scanner,” and “scan a surface of the workpiece”²²

The parties disagree as to whether “scan,” “scanner,” and “scan a surface of the workpiece” need be construed, given the magistrate judge’s proposed construction of the phrase “scanning the surface of the workpiece”²³ as found in the ‘525 patent claims. (See D.I. 575, 619 Dec. 27, 2002 Joint Claim Construction Submission For U.S. Patent No.

²²The word “scan” is used in claims 21 and 25 of the ‘259 patent. The word “scanner” is used in claims 1, 21, 25, 29, and 30 of the ‘259 patent. The phrase “scan a surface of the workpiece” is used in claims 1 and 29 of the ‘259 patent.

²³The magistrate judge construed “scanning the surface of the workpiece” as used in the ‘525 patent to mean that “[t]he entire surface of the workpiece is inspected through relative motion of the incident beam of P-polarized light and/or the workpiece being inspected. The phrase is broad enough to encompass rotation and translation of the workpiece during scanning.” *ADE Corp.*, 220 F. Supp. 2d at 312-13.

6,292,259.²⁴) Because the Court has not previously ruled on the objection made to the magistrate judge's proposed construction (D.I. 531), those terms are interpreted herein. The Court's decision regarding those terms is also informed by a *de novo* review of the phrase "scanning the surface of the workpiece" as found in the '525 patent claims and serves as the Court's ruling on the objection to the magistrate judge's proposed construction of that phrase.

1. ADE's Position

ADE argues that "scanner" should be construed to mean "components that together allow the entire workpiece to be scanned; where 'scanned' means 'inspected through relative motion of the incident beam of P-polarized light and/or the workpiece being inspected.'" (D.I. 595 at 28; D.I. 613 at 3-4 (quoting D.I. 318 at 52); JCCS at 2.) ADE also proposes that the phrase "scan a surface of the workpiece" should be construed consistently with the magistrate judge's previous construction of the phrase "scanning the surface of the workpiece." (*Id.*) ADE does not set forth a proposed construction of the word "scan," detached from the entire phrase "scan a surface of the workpiece." (See D.I. 595; D.I. 613; JCCS.)

In support of its proposed construction of the word "scanner," ADE points to the magistrate judge's proposed construction of the '525 patent and to the '259 and '525 intrinsic record. (JCCS at 2-3.) ADE then argues that the magistrate judge properly

²⁴ Hereinafter the parties' December 27, 2002 Joint Claim Construction Submission For U.S. Patent No. 6,292,259 B1 will be cited to as JCCS. The JCCS is a document setting forth each party's proposed construction for each term in dispute and, importantly, a compilation of each party's evidence from the intrinsic record in support of their proposed constructions. The record citations and quotations are arranged term by term, thus providing easier access for the Court, in a single document, to the parties' positions and the record support for those positions. The parties' submission of the JCCS in this case has proven helpful and is appreciated by the Court.

construed the phrase “scanning the surface of the workpiece” in relation to the ‘525 patent and that the magistrate judge’s construction of “scanning” is equally applicable to the “permutations” of that word, “scan” and “scanner,” as used in the ‘259 patent. (D.I. 595 at 28.) ADE supports its argument by asserting that “[n]othing in the intrinsic record compels an interpretation for either of these related set of terms that is clearly inconsistent with their plain and ordinary meanings.” (*Id.*) Moreover, asserts ADE, the magistrate judge already rejected KLA’s attempts to narrow the scope of the word “scanning.” (D.I. 613 at 4-6.) The magistrate judge’s reasoning, argues ADE, applies with equal force to the words “scan” and “scanner” and the phrase “scan a surface of the workpiece” as found in the claims of the ‘259 patent. (*Id.*) To conclude its argument, ADE quotes definitions of “scan” and “scanner” as found in several dictionaries. (*Id.* at 7-8.)

2. KLA’s Position

KLA, in contrast, proposes that the Court construe the words “scanner” and “scan” as opposed to the phrase “scan a surface of the workpiece.” (D.I. 594 at 11-12; D.I. 615 at 13-14; JCCS at 2.) KLA suggests that “scanner” be construed to “include a ‘beam deflector’ such as an acousto-optical deflector” and “scan” should be construed to mean “deflect the beam along a relatively narrow scan path.” (*Id.*) In support, KLA directs the Court to numerous intrinsic citations, including the prosecution history of the ‘701 patent. (*Id.*) KLA asserts that the “scanner” taught in the ‘259 specification includes “a component or components for deflecting the incident beam[] . . . [and a scan is performed] by imparting a relatively narrow scan path.” (D.I. 594 at 12.) KLA then points to figures of the ‘259

patent and argues that those figures indicate that the “scanner” is closely associated with the incident beam of p-polarized light. (*Id.* at 12-13.)

KLA also asserts that the description of the ‘259 invention in the specification of the patent makes it clear that the “scan” performed by the “scanner” is “along a relatively narrow scan path.” (*Id.* at 14.) Moreover, asserts KLA, the magistrate judge’s construction of “scanning” in relation to the ‘525 patent does not impart a plain and ordinary meaning to the words “scan” and “scanner” in the ‘259 patent, as ADE suggests. (D.I. 615 at 13 (citing D.I. 594 at 14-17).) This, argues KLA, is clear from the ‘259 specification and prosecution history of the ‘701 patent,²⁵ which clarify that the inventors “clearly and unequivocally distinguished their invention from the prior art cited by the examiner on the grounds that their invention employed ‘narrow angle scans.’” (*Id.*)

3. Analysis

The parties advance essentially the same arguments that they did before the magistrate judge when contesting the claim language of the ‘525 patent. See *ADE Corp.*, 220 F. Supp. 2d at 312-13. The magistrate judge, in sifting those arguments and reviewing the record, observed that “scanning” is a broad term. *Id.* at 312. The magistrate judge then turned to a review of the ‘525 written description and drawings, stating:

The ‘525 disclosure teaches several ways to perform a surface scan of a workpiece. During some of these scans, the workpiece is translated and rotated along its material path as it is inspected... .

* * *

²⁵As explained earlier, *supra* at 7, the ‘701 patent is the “grandparent” patent to the ‘259 patent, since the ‘701 patent is the parent of the ‘525 patent and since the ‘259 patent is a continuation of the ‘525.

Claim 1 of the '525 patent does not limit "scanning" to any particular type of scan; instead, the claim plainly states that one step in the disclosed inspection method is to scan the surface of the workpiece at the inspection station. In contrast, KLA would have this court read a non-existent limitation into the phrase 'scanning the surface of the workpiece' from dependent claim 21... .

... Some movement must exist between the light beam and the surface to inspect the entire surface "scanned" and effectuate the inventors' invention. Claim 1 of the '525 patent ensnares all such movement whereas dependent claim 21 specifies that the movement is translation and rotation. Any other construction is simply illogical and inconsistent with the invention taught in the '525 patent.

Id. at 312-13 (citations omitted).

The '259 patent teaches the same invention as does the '525 patent but it claims the invention differently, and both the '259 and '525 patents descend from the application that led to the '701 patent. Accordingly, the inventors' statements with regard to the words "scan" and "scanner" during the prosecution of the '701 patent, and the use of similar language in the '525 and '259 patent claims, are of significance.

In the '701, '525, and '259 patent specifications, the word "scanner" refers to a component or combination of components for deflecting the incident beam along a "scan" path to "scan a surface of the workpiece" being inspected. During prosecution of the '701 patent, the inventors distinguished their invention from the prior art in an attempt to traverse an earlier rejection by the examiner under Section 103(a). (D.I. 627 at '701 Patent Prosecution File History, Applicants' Response to Office Action mailed Mar. 4, 1996 at 1-4.) The inventors argued that their invention uses an "acousto-optical deflector" to provide "a narrow subscan" and "teaches a single scan over each area of the wafer" to maximize

“high spatial resolution, complete coverage of the workpiece surface, and high throughput. ...” (*Id.*)

The examiner was not persuaded by these arguments and again rejected the applicants’ claims under Section 103(a), stating that “[t]he rejected claims call for scanning systems with a main scan and a smaller subscan; this is taught by Yoshii et al.” (*Id.* at ‘701 Patent Prosecution File History, Final Office Action mailed on Oct. 23, 1996 at 3-4, ¶¶ 4-5.) The examiner then restated that the prior art does not teach adjusting the speed of the scanning system and does not teach the use of a plurality of collectors to collect both forwardly and backwardly scattered light. (*Id.* at 3-5, ¶¶ 4, 6.) Subsequently, the applicants amended their application consistent with the examiner’s remarks to include, in claim 1, a light channel detector and a dark channel collector, and in claim 22 a “means for varying the speed of rotating the workpiece ... during a scan” to maintain a constant scan speed. (*Id.* at ‘701 Patent Prosecution File History, Amendment After Final dated Jan. 20, 1997 at 1-2.) The applicants’ did not readdress the examiner’s remark that their invention employs a main scan and a smaller subscan. (*Id.*)

Having defined “scanner” in the specification of the ‘701, ‘525, and ‘259 patents and having evidenced a clear disavowal of claim scope through argument in attempt to traverse the prior art during prosecution of the ‘701 patent, the applicants have limited the possible construction of “scan,” and “scanner,” and the permutation “scanning,” as found in the claims of the ‘525 patent. See *Elkay Mfg. Co.*, 192 F.3d at 979-80 (holding that arguments made during prosecution of an earlier patent application are accorded the same weight as amendments and, therefore, applicant’s arguments to distinguish prior art relinquished a

proposed construction of the claim). Accordingly, the Court construes (1) “scan” to mean deflecting the beam of P-polarized light along a relatively narrow scan path, (2) “scanner” to mean a component or combination of components employing a deflector such as an acousto-optical deflector for directing the beam of P-polarized light along a relatively narrow scan path, and (3) “scan a surface of the workpiece” to mean the surface of the workpiece is inspected by deflecting the beam of P-polarized light along a relatively narrow scan path. The phrase is broad enough to encompass relative motion of the workpiece during a scan.

The magistrate judge had construed the phrase “scanning the surface of the workpiece,” as used in the ‘525 patent, to mean that “[t]he entire surface of the workpiece is inspected through relative motion of the incident beam of P-polarized light and/or the workpiece being inspected. The phrase is broad enough to encompass rotation and translation of the workpiece during scanning.” *ADE Corp.*, 220 F. Supp. 2d at 312-13.

Pursuant to the Court’s *de novo* review of this phrase, the magistrate judge’s construction of “scanning the surface of the workpiece,” is modified to be consistent with the foregoing analysis of “scan,” “scanner,” and “scan a surface of the workpiece.” As used in the ‘525 patent, “scanning the surface of the workpiece” means the entire surface of the workpiece is inspected along a relatively narrow scan path through relative motion of the incident beam of P-polarized light and/or the workpiece being inspected. As the magistrate concluded, the phrase is broad enough to encompass rotation and translation of the workpiece during scanning.

C. “collector”²⁶

1. ADE’s Position

ADE asserts that “collector” should be construed consistent with its ordinary and plain meaning to mean “a structure capable of collecting scattered light.” (D.I. 613 at 16.) In support, ADE argues that this meaning is consistent with the dictionary definition of the word. (*Id.* at 16-17.) ADE further asserts that nothing in the specification or prosecution history of the ‘259 patent would suggest limiting the construction of “collector” to “a lens,” as proposed by KLA. (*Id.*)

2. KLA’s Position

KLA suggest that the term “be construed to mean: ‘a lens.’” (D.I. 594 at 17.) In support, KLA directs the Court to the ‘259 patent specification where the inventors describe collectors as lenses. (*Id.* at 18.) KLA also points to Figure 6 of the ‘259 patent. (*Id.*) In addition, KLA argues that, although the specification describes other lens arrangements, it makes clear that “these alternative embodiments merely envision different ‘lens arrangements.’” (*Id.*)

3. Analysis

The ‘259 specification teaches that a “collector” “will be understood by those skilled in the art to be compound lenses” (D.I. 627 at ‘259 Patent col. 7 ll. 31-33.) The specification also provides that “other lens arrangements may also be used according to the present invention.” (*Id.* at ll. 33-34.) The inventors specifically defined a “collector” as “compound lenses ... [and] other lens arrangements” (*Id.*) Claims 1, 21, 25, 29, and

²⁶The word “collector” is used in claims 1, 21, 25, 29, and 30 of the ‘259 patent.

30, in which the term “collector” appears do not alter that definition of the term. (See *id.* at col. 12 l. 18 to col. 15 l. 36.) There is also nothing in the remainder of the ‘259 specification or prosecution history that a person of ordinary skill in the art could refer to that would create confusion as to what the inventors’ intended when they used the word “collector” to claim their invention.

The Court, therefore, construes “collector,” as the inventors defined the term, to mean compounded lenses or other lens arrangements. *Serrano v. Telular Corp.*, 111 F.3d 1578, 1582 (Fed. Cir. 1997) (“The inventors’ definition and explanation of the meaning of the [claim] word[s] ..., as evidenced by the specification, controls the interpretation of ... claim term[s].”) (citing *Vitronics*, 90 F.3d at 1582).

D. “scattered from the surface of the workpiece”²⁷

1. ADE’s Position

ADE argues that “this simply-worded term requires no further interpretation. The phrase simply means what it says: ‘light scattered from the surface of the workpiece.’” (D.I. 613 at 17.) ADE goes on to assert that KLA’s proposed construction is in error for importing awkward limitations into the phrase “concerning (1) the placement of the workpiece; (2) the relative timing of when light is collected vis-à-vis when the workpiece is present; and (3) the placement of collectors as set forth in the preferred embodiment.” (*Id.*)

2. KLA’s Position

KLA argues that the phrase “scattered from the surface of the workpiece” should be construed to mean that “the workpiece is present in the inspection system, with light

²⁷The phrase “scattered from the surface of the workpiece” is used in claims 1, 21, 25, 29, and 30 of the ‘259 patent.

scattered therefrom while the collectors are configured in the manner recited.” (D.I. 594 at 17.) KLA asserts that when the specification is read in its entirety, the workpiece must be present in the inspection system during a scan and there is no basis “for collecting light while the workpiece is not in the inspection station.” (*Id.* at 18.)

3. Analysis

The Court agrees with ADE. The phrase does not naturally carry such limitations nor are such limitations mandated by the intrinsic record. The Court, therefore, will not read limitations into the construction of this claim language. See *Tate Access Floors, Inc.*, 222 F.3d at 966 (“[I]t is improper to read limitation [explicit or implicit] from the written description into a claim.”). The Court construes “scattered” to mean diffused or dispersed and the phrase “scattered from the surface of the workpiece” to mean diffused or dispersed from the surface of the workpiece. MERRIAM-WEBSTER’S COLLEGIATE DICTIONARY 1042 (10th ed. 2002).²⁸

E. “one or more converters”²⁹

1. ADE’s Position

ADE argues that “one or more converters” should be construed according to its plain meaning to mean “one or more components for converting light collected by the collectors into signals, typically electronic signals, which correspond to the amount of light, e.g., PMTs or photodetectors.” (D.I. 613 17-18.) ADE further asserts that KLA, once again, attempts to read improper limitations into the construction of this claim language. (*Id.* at

²⁸There has been no assertion that the meaning of the words the parties contest has changed since the relevant priority dates for the patents at issue.

²⁹The phrase “one or more converters” is used in claims 1, 21, 25, 29, and 30 of the ‘259 patent.

18.) ADE then avers that a patent specification need not “catalogue and describe every possible embodiment [or arrangement of an invention] covered by the [patent] claims” (*Id.*)

2. KLA's Position

KLA, on the other hand, argues that “one or more converters” “should be construed to mean: ‘one or more separate detectors, each being in optical communication with a separate one of the first and second collectors.’” (D.I. 594 at 19.) KLA directs the Court to the ‘259 specification in urging adoption of this construction. (*Id.* at 19-20.) In particular, KLA refers to portions of the ‘259 specification describing that “each collector must have a converter associated with it.” (*Id.* at 19.) In other words, argues KLA, “the specification describes a one-to-one correlation between collectors ... and their respective detectors” and this “one-to-one correlation ... is necessary to practice the claimed invention.” (*Id.* at 20.)

3. Analysis

The ‘259 specification does not specifically define what is meant by a “converter.” The claims in which the phrase “one or more converters” appears, however, do give guidance as to the proper construction. Claim 1 of the ‘259 patent is representative. The fifth element of that claim states that the invention covered by claim 1 employs “one or more converters for converting the collected light components into respective signals representative of the light scattered into the central zone and oblique zone.” (D.I. 627 at ‘259 Patent col. 12 ll. 32-35.) It is clear, therefore, that the “converter” must be capable of transforming collected light into signals that represent the light that was collected. Given

this, a person of ordinary skill in the art would reference the specification to determine what physical structures operating in combination could perform such a task, *i.e.*, what did the inventors intend when they used the word “converter” to define their invention.

Both parties directed the Court to a specific passage in the specification to aid its interpretation. (JCCS at 7.) A portion of that passage provides that:

The dark channel detector ... further includes a forward channel detector ... a center channel detector ... and a back channel detector ... each respectively positioned in optical communication with a corresponding collector ... and means electrically connected to the forward, center and back channel detectors ... and responsive to electrical signals from said detectors for determining the presence of a particle [or pit] on the surface ... of a workpiece The determining means of the collector is preferably electronic signal discrimination circuitry ... and understood by those skilled in the art, which receives signals representative of collected light from the light channel detector ... and the dark channel detector... .

(D.I. 627, ‘259 Patent Prosecution File History, ‘259 Patent at col. 7 ll. 46-60.) It appears from the foregoing passage and the claim language surrounding the phrase “one or more converters” that a converter is a detector in optical communication and electrically connected to a corresponding collector. The Court, therefore, construes “converter” to mean a detector in optical communication and electrically connected to a corresponding collector. Accordingly, the phrase “one or more converters” means one or more such detectors in optical communication and electrically connected to one or more corresponding collectors.

F. “substantially only backscattered light”³⁰

1. ADE’s Position

ADE argues that “substantially only backscattered light” should be construed to mean “light generally scattered in the backward direction.” (D.I. 613 at 19.) ADE offers little supporting its proposed construction of this phrase other than a plain-and-ordinary-meaning argument. (*Id.*)

2. KLA’s Position

Consistent with its argument as to the phrase “oblique zone” and the magistrate judge’s prior construction of that phrase, KLA suggests that the phrase “substantially only backscattered light” should “be construed to mean ‘only backscattered light.’” (D.I. 594 at 21.) Alternatively, KLA proposes that if the Court cannot “reconcile the recited claim language with the clear teaching of the specification and prosecution history” the Court can invalidate the dependent claim in which the phrase appears under 35 U.S.C. § 112, ¶ 4.³¹

3. Analysis

Given this Court’s construction of the phrase “oblique zone,” *supra* at 23-37, the Court is compelled to construe the phrase “substantially only backscattered light” to mean that only backscattered light is collected.

³⁰The phrase “substantially only backscattered light” is used in claim 6 of the ‘259 patent.

³¹Section 112, paragraph 4 provides as follows:

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

35 U.S.C. § 112, ¶ 4 (2003).

G. “predetermined value,” “predetermined measure,” and “threshold value”³²

1. ADE’s Position

ADE proposes that “predetermined value should mean “a value determined prior to comparison of the value to the ratio of the signals” and “predetermined measure” should mean “a value or functional relationship determined prior to comparison with the ratio of the intensity signals.”(JCCS at 10-11.) ADE also asserts that “threshold value” should mean “a minimum value.” (*Id.* at 11.)

2. KLA’s Position

In contrast, KLA argues that “predetermined value” should mean “a value determined prior to scanning the workpiece” and “predetermined measure” should be construed to mean “a measure determined prior to scanning the workpiece.” (*Id.* at 10-11.) KLA then suggests that the Court construe “threshold value” to mean “a value determined prior to scanning the workpiece.” (*Id.* at 11.)

3. Analysis

“Value” and “measure” have ordinary meanings representing numerical quantities. MERRIAM-WEBSTER’S COLLEGIATE DICTIONARY 1301, 719 (10th ed. 2002). Similarly, “predetermined” means fixed before another event occurred. *Id.* at 915. The parties’ real dispute is over when those values and measures are set, *i.e.*, when the predetermination occurs. The answer to that question cannot be determined from the claims in which the phrases are found and thus requires resort to the remainder of the intrinsic record.

³²The phrase “predetermined value” is used in claims 7, 10, 22, and 31 of the ‘259 patent. The phrase “predetermined measure” is used in claims 9, 24, and 33 of the ‘259 patent. The phrase “threshold value” is used in claims 8, 23, and 32 of the ‘259 patent.

Referring to the '259 patent claims in which the phrases "predetermined value" and "predetermined measure" appear (claims 7, 9, 10, 22, 24, 31, and 33), the system controller, comparator, or classifier either compare or classify signals to detect defects on the surface of the workpiece being scanned. ADE directs this Court to col. 11 ll. 10-49 of the '259 specification for a construction of the phrases "predetermined value" and "predetermined measure." (JCCS at 10-11.) KLA also directs the Court to the same passage, which discusses the algorithm depicted in Figure 16 of the '259 patent.

As earlier discussed, *supra* at 5-6 and 34-36, Figure 16 of the '259 patent teaches an algorithm for comparing the signals from the center, back, and forward channel detectors to determine whether a defect is a pit or particle. Although it is evident from the discussion of this algorithm in the '259 written description that the value or measure used in the comparison must be determined before the signals are compared, there is no support, as KLA suggests, for concluding that the value or measure must be determined before a scan is performed. (See D.I. 627, '259 Patent Prosecution File History, '259 patent at col. 9 l. 25 to col. 11 l. 36.) The Court, therefore, concludes, as ADE proposes, that "predetermined value" and "predetermined measure" mean a value or measure determined before the signals are compared. Similarly, there is no basis in the '259 specification for restricting the determination of a "threshold value" to a point in time preceding the scanning of the workpiece, as KLA suggests. The Court holds that it means a numerical quantity "above which something is true or will take place and below which it is not or will not." See MERRIAM-WEBSTER'S COLLEGIATE DICTIONARY 1225 (10th ed. 2002).

H. “determines the size of the pits and particles” and “groups the pits and particles based at least in part on the determination of size”³³

Although the parties identified the phrases “determines the size of the pits and particles” and “groups the pits and particles based at least in part on the determination of size” as contested claim terminology, they limited their argument to a construction of the word “size” as it appears in these phrases. (See D.I. 594 at 22, D.I. 613 at 19-20.) Accordingly, the Court will also focus its discussion on the word “size.”

1. ADE’s Position

ADE proposes that the Court construe “size” “to mean that, ‘the size may be actual size, PSL equivalent size or size based on some other scale or measure.’”³⁴ (D.I. 613 at 19.) In support, ADE argues that this construction is consistent with the plain meaning of the word and asserts that the ‘259 specification does not use the word inconsistently. (*Id.*)

2. KLA’s Position

KLA counters by suggesting that the Court construe “size” to mean “‘determining a PSL (polystyrene latex) equivalent size of the pits and particles.’” (D.I. 594 at 22.) KLA argues that this is the appropriate construction of the word since the ‘259 specification is silent as to the meaning, this was the common art understanding of the word in the surface inspection industry at the time of the ‘259 priority date, and the inventors understood the

³³The phrase “determines the size of the pits and particles” is used in claims 15 and 40 of the ‘259 patent. The phrase “groups the pits and particles based at least in part on the determination of size” is used in claims 16 and 41 of the ‘259 patent.

³⁴In the silicon wafer inspection industry, it is typical to calibrate the laser scanning instruments employed in scanning the surface of the wafers by using them to measure the size of spheres of polystyrene latex (PSL). (D.I. 320, Ex. J at 7.) Thus, a PSL equivalent size refers to a defect size equivalent to a measurement for a sphere of polystyrene latex used in the calibration the scanning equipment. (*Id.*)

word “size” as referring to a PSL equivalent size when using the word in the claims of the ‘259 patent. (*Id.*)

3. Analysis

The word “size” has a readily understood, ordinary meaning. As to the ‘259 patent and its inventors, the specification and prosecution history not use the word inconsistently with its ordinary meaning, and the Court is not persuaded by KLA’s arguments for altering that ordinary meaning. Accordingly, the Court construes the word to mean a physical magnitude or dimension. See MERRIAM-WEBSTER’S COLLEGIATE DICTIONARY 1095 (10th ed. 2002). Thus, the phrase “determines the size of the pits and particles” means determines the physical magnitude or dimension of the pits and particles, and the phrase “groups the pits and particles based at least in part on the determination of size” means groups the pits and particles based at least in part on the determination of physical magnitude or dimension.

I. “map”³⁵

1. ADE’s Position

ADE suggest that the Court construe “map” to mean “a visual representation of the location of pit and particle defects, or the electronically stored image file (e.g., bit map) directly used to generate the visual display.” (JCCS at 14.)

2. KLA’s Position

KLA argues that the word should mean ““electronic information indicating a location of an anomaly.”” (*Id.*)

³⁵The word “map” is used in claims 18, 25, 26, 27, 28, 34, 35, 36, and 37 of the ‘259 patent.

3. Analysis

The inventors in the '259 written description refer to data being stored in memory to define a "map" of the particles and pits and they stated that Figures 20, 21, and 22, one of which is reproduced below, represent "maps" of a wafer surface. (D.I. 627, '259 Patent Prosecution File History, '259 Patent at col. 11 l. 50 to col. 12 l. 7.)

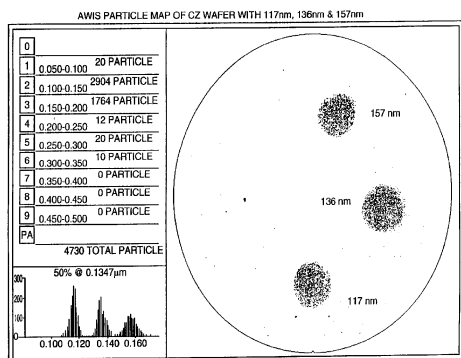


FIG. 21

Consistent with this description, the Court construes "map" to mean a visual representation of the location of pit and particle defects on the surface of a scanned workpiece that includes the underlying electronically stored data corresponding to said visual representation.

J. “system controller,” “comparator,” and “classifier”³⁶

1. ADE’s Position

ADE asserts that a plain and ordinary meaning of “system controller” should be adopted by the Court and suggests that the Court construe the phrase to mean “hardware, software or some combination thereof for controlling the system in whole or in part.” (D.I. 595 at 29.) ADE says that “comparator” should mean “hardware, software, or some combination thereof, capable of being configured to receive and compare signals.” (JCCS at 17.) ADE also argues that “classifier” should be construed to mean “hardware, software, or some combination thereof, capable of being configured to classify defects.” (*Id.*)

2. KLA’s Position

KLA does not “believe that a material dispute exists concerning” the meaning of “system controller.” (D.I. 615 at 12 n.4.) KLA, however, suggests that “system controller” means “electronic hardware or an electronic hardware/software combination.” (D.I. 575 at 8.) KLA asserts that the “comparator” should mean “electronic hardware or an electronic hardware/software combination configured to receive and compare the signals.” (JCCS at 17-18.) “Classifier,” asserts KLA, should be construed to mean “electronic hardware or an electronic hardware/software combination configured to classify defects as pits or particles based at least in part on the comparison.” (*Id.*)

³⁶The phrase “system controller” is used in claims 1, 8, 9, 13, 14, 15, 16, 17, 18, 19, 20, 25, 26, 27, 28, 30, 32, 33, 35, 36, 37, 38, 39, 40, 41, and 42 of the ‘259 patent. The word “comparator” is used in claims 21, 22, and 29 of the ‘259 patent. The word “classifier” is used in claims 21, 23, and 24 of the ‘259 patent.

3. Analysis

The claim term “system controller” is described in the ‘259 specification. The terms “comparator” and “classifier” are not.³⁷ However, “comparator” and “classifier” are plain and ordinary words. In the dictionary, a “comparator” is defined as “a device for comparing something with a similar thing or with a standard measure,” and the definition of “classifier” is “a machine for sorting out the constituents of a substance.” MERRIAM-WEBSTER’S COLLEGIATE DICTIONARY 211, 233 (10th ed. 2002). Nothing in the specification or intrinsic record dictates a more restrictive definition. The Court, therefore, construes “comparator” to mean a device for comparing something with a similar thing or with a standard measure and “classifier” to mean a machine for sorting out the constituents of a substance.

As to the term “system controller,” the inventors specified that “[t]he system controller ... operates the inspection system ... under the supervision and direction of a human operator, stores and retrieves data generated by the system ..., and performs data analysis preferably responsive to predetermined commands.” (D.I. 627, ‘259 Patent Prosecution File History, ‘259 Patent at col. 8 ll. 27-31.) The inventors further specified that “[t]he surface inspection system ... as illustrated in FIG. 7, and as understood by those skilled in the art, preferably is formed of a combination of software and hardware which forms these various components, or combinations thereof, of the system” (*Id.* at col. 9 ll. 5-10.) The Court, therefore, construes “system controller” to mean a combination of software and hardware operated under the direction of a human operator that is capable

³⁷ADE directs the Court’s attention to col. 11 ll. 24-36 of the ‘259 patent specification for a construction of the claim terms “comparator” and “classifier.” (JCCS at 17.) KLA points the Court to the same intrinsic evidence it cited for a construction of the claim term “system controller” (‘259 Patent at Figures 1, 3, and 7; col. 7 ll. 54-60; col. 8 l. 55 to col. 9 l. 10). (*Id.* at 8, 17.)

of storing and retrieving data generated by the system and of performing data analysis on said data, preferably responsive to predetermined commands.

K. “sorts the workpieces”³⁸

1. ADE’s Position

ADE suggests that the Court should construe this phrase to mean “arrange at least in part according to class, kind or size of the defect, including whether the defect is a pit or a particle.” (JCCS at 15 (citing D.I. 546 at 17-18, 52-53.)

2. KLA’s Position

KLA also does not “believe that a material dispute exists concerning” the meaning of “sorts the workpieces.” (D.I. 575 at 1, 14-15; see also D.I. 615 at 12 n.4.) KLA, however, did incorporate its earlier arguments, made during the construction of the ‘525 patent, that this limitation rendered the claims in which it was found invalid. (*Id.*) KLA also reasserted that the ‘259 specification does not disclose a system controller that sorts workpieces. (*Id.*)

3. Analysis

The Court will not, at this juncture, consider the validity of the claims containing the expression “sorts the workpieces.”³⁹ The phrase is easily understood. It is found in claims 19 and 20, reproduced below, of the ‘259 patent:

19. The surface inspection system of claim 1 wherein the system controller further sorts the workpieces based at

³⁸The phrase “sorts the workpieces” is used in claims 19 and 20 of the ‘259 patent.

³⁹Whether the ‘259 disclosure enables a system controller that is capable of sorting workpieces is a matter for another day. That issue does not advance the claim construction of the phrase in question.

least in part on whether the system controller classifies a defect as a pit or a particle.

20. The surface inspection system of claim 19 wherein the system controller sorts the workpieces for recleaning based at least in part on whether the system controller classifies a defect as a pit or a particle.

(D.I. 627, '259 Patent Prosecution File History, '259 Patent at col. 13 ll. 43-50.)

One common and appropriate definition of “sorts” is “to put in a certain place or rank according to kind, class, or nature.” MERRIAM-WEBSTER’S COLLEGIATE DICTIONARY 1119 (10th ed. 2002). Consistent with use of “sorts the workpieces” in the claims and the ordinary meaning of the word “sorts,” the Court construes the phrase “sorts the workpieces” to mean arranges the workpieces according to some type of ranking or classification.

IV. CONCLUSION

The following table summarizes the Court’s construction of the disputed terms in the '259 patent:

| <u>Contested Language</u> | <u>The Court's Construction</u> |
|--|--|
| "oblique zone" | "Oblique zone" means a collection zone differing in polar angle from the central collection zone that does not collect the same light being collected by the central zone but, instead, collects either forward or backward scattered light but does not collect both simultaneously. |
| "scan," "scanner," and "scan a surface of the workpiece" | "Scan" means deflecting the beam of P-polarized light along a relatively narrow scan path. "Scanner" means a component or combination of components employing a deflector such as an acousto-optical deflector for directing the beam of P-polarized light along a relatively narrow scan path. "Scan a surface of the workpiece" means the surface of the workpiece is inspected by deflecting the beam of P-polarized light along a relatively narrow scan path. The phrase is broad enough to encompass relative motion of the workpiece during a scan. |
| "collector" | "Collector" means compounded lenses or other lens arrangements. |
| "scattered from the surface of the workpiece" | "Scattered from the surface of the workpiece" means diffused or dispersed from the surface of the workpiece. |
| "one or more converters" | "One or more converters" means one or more detectors in optical communication and electrically connected to one or more corresponding collectors. |
| "substantially only backscattered light" | "Substantially only backscattered light" means that only backscattered light is collected. |

| | |
|--|--|
| <p>“predetermined value,” “predetermined measure,” and “threshold value”</p> | <p>“Predetermined value” and “predetermined measure” is a value or measure determined before the signals are compared. “Threshold value” means a numerical quantity above which something is true or will take place and below which it is not or will not.</p> |
| <p>“determines the size of the pits and particles” and “groups the pits and particles based at least in part on the determination of size”</p> | <p>“Determines the size of the pits and particles” means determines the physical magnitude or dimension of the pits and particles and “groups the pits and particles based at least in part on the determination of size” means groups the pits and particles based at least in part on the determination of physical magnitude or dimension.</p> |
| <p>“map”</p> | <p>“Map” means a visual representation of the location of pit and particle defects on the surface of a scanned workpiece that includes the underlying electronically stored data corresponding to said visual representation.</p> |
| <p>“system controller,” “comparator,” and “classifier”</p> | <p>“System controller” means a combination of software and hardware operated under the direction of a human operator that is capable of storing and retrieving data generated by the system and of performing data analysis on said data preferably responsive to predetermined commands. “Comparator” means a device for comparing something with a similar thing or with a standard measure. “Classifier” means a machine for sorting out the constituents of a substance.</p> |
| <p>“sorts the workpieces”</p> | <p>“Sorts the workpieces” means arranges the workpieces according to some type of ranking or classification.</p> |

In addition, the Court has also construed the following terms from the ‘525 patent:

| <u>Contested Language</u> | <u>The Court's Construction</u> |
|--|--|
| <p>“second oblique zone offset angularly from said first zone”</p> | <p>“Second oblique zone offset angularly from said first zone” means a second collection zone differing in polar angle from the central collection zone that does not collect light being collected by the central zone but, instead, collects either forward or backward scattered light but does not collect both simultaneously.</p> |
| <p>“scanning the surface of the workpiece”</p> | <p>“Scanning the surface of the workpiece” means the entire surface of the workpiece is inspected along a relatively narrow scan path through relative motion of the incident beam of P-polarized light and/or the workpiece being inspected. The phrase is broad enough to encompass rotation and translation of the workpiece during scanning.</p> |

An order will issue giving effect to this Opinion.