

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte Dan Wack, Ady Levy, Kyle A. Brown, Gary Bultman,
Mehrdad Nikoonahad, and John Fielden

Appeal No. 2006-3246
Application No. 09/956,849
Technology Center 2800

ON BRIEF

Before DIXON, BARRY, and BLANKENSHIP, Administrative Patent Judges.
DIXON, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. §134 from the Examiner's final rejection of claims 6192-6252, 6312, 6432, 6492, and 6548, which are

all of the claims pending in this application. All other claims have been canceled by the preliminary amendment filed Mar. 5, 2002.

We AFFIRM-in-PART.

BACKGROUND

Appellants' invention relates to methods and systems for determining a property of a specimen prior to, during, or subsequent to lithography. An understanding of the invention can be derived from a reading of exemplary claim 6192, which is reproduced below.

6192. A system configured to determine at least one property of a specimen during use, comprising:

a lithography track configured to perform one or more steps of a lithography process on the specimen during use;

a spectroscopic ellipsometer coupled to the lithography track, wherein the spectroscopic ellipsometer is configured to generate one or more output signals responsive to the at least one property of the specimen during use; and

a processor coupled to the spectroscopic ellipsometer, wherein the processor is configured to determine the at least one property of the specimen from the one or more output signals during use.

PRIOR ART

The prior art references of record relied upon by the Examiner in rejecting the appealed claims are:

Moore	5,872,632	Feb. 16, 1999
Yoshioka et al. (Yoshioka)	5,968,691	Oct. 19, 1999
Jann et al. (Jann)	5,189,481	Feb. 23, 1993
Kuriyama et al. (Kuriyama)	4,865,445	Sep. 12, 1982

REJECTIONS

Rather than reiterate the conflicting viewpoints advanced by the Examiner and the Appellants regarding the above-noted rejections, we make reference to the Examiner's Answer (mailed Nov. 17, 2005) for the reasoning in support of the rejection, and to Appellants' Brief (filed Sep. 1, 2005) and Reply Brief (filed Jan. 10, 2006) for the arguments thereagainst.

Claims 6192-6196, 6199, 6201-6252, 6312, 6432, 6492, and 6548 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Moore in view of Yoshioka. Claims 6197 and 6198 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Moore in view of Yoshioka and further in view of Jann. Claim 6200 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Moore in view of Yoshioka and further in view of Kuriyama.

OPINION

In reaching our decision in this appeal, we have given careful consideration to Appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by Appellants and the Examiner. As a consequence of our review, we make the determinations that follow.

While Appellants do not identify which specific claim numbers correspond to each of the embodiments in the Summary of Claimed Subject Matter in the brief, it appears that Appellants have set forth a description of each of the independent claims on appeal as required by 37 CFR 41.37.

Additionally, we note that the thirteen groups of claims separately argued by Appellants appear to each be directed to separate aspects of the overall combination of claimed elements as different sub-combinations and embodiments as disclosed in the summary of the invention in Appellants' specification. While we find the independent claim 6192 is the generic base claim, the Examiner should reconsider the variation in the subject matter in the present prosecution for possible restriction. Rather than prosecute the total 6632 claims originally filed in this application and pay the filing fee thereto, Appellants elected to cancel a majority of the claims and prosecute the broadest combination of elements. (See Preliminary Amendment filed Mar. 4, 2002.) Here, we note that the divergent subject matter of the various claims makes for problematic prosecution which we find to be compounded by a specification which does not define terms used in the claims and the specification provides a myriad of exemplary embodiments and combinations. With this a background, we will address the groupings as generally set forth by Appellants so as to clearly set forth our review of the rejected claims.

35 U.S.C. § 103

In rejecting claims under 35 U.S.C. § 103, the Examiner bears the initial burden of presenting a prima facie case of obviousness. See In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). A prima facie case of obviousness is established by presenting evidence that the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed

combination or other modification. See In re Lintner, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972). Furthermore, the conclusion that the claimed subject matter is prima facie obvious must be supported by evidence, as shown by some objective teaching in the prior art or by knowledge generally available to one of ordinary skill in the art that would have led that individual to combine the relevant teachings of the references to arrive at the claimed invention. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Rejections based on § 103 must rest on a factual basis with these facts being interpreted without hindsight reconstruction of the invention from the prior art. The Examiner may not, because of doubt that the invention is patentable, resort to speculation, unfounded assumption or hindsight reconstruction to supply deficiencies in the factual basis for the rejection. See In re Warner, 379 F.2d 1011, 1017, 154 USPQ 173, 177 (CCPA 1967). Our reviewing court has repeatedly cautioned against employing hindsight by using the Appellant's disclosure as a blueprint to reconstruct the claimed invention from the isolated teachings of the prior art. See, e.g., Grain Processing Corp. v. American Maize-Prods. Co., 840 F.2d 902, 907, 5 USPQ2d 1788, 1792 (Fed. Cir. 1988).

When determining obviousness, “the [E]xaminer can satisfy the burden of showing obviousness of the combination ‘only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.’” In re Lee, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002), citing In re Fritch, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). “Broad conclusory

statements regarding the teaching of multiple references, standing alone, are not evidence.” In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). “Mere denials and conclusory statements, however, are not sufficient to establish a genuine issue of material fact.” Dembiczak, 175 F.3d at 999-1000, 50 USPQ2d at 1617, citing McElmurry v. Arkansas Power & Light Co., 995 F.2d 1576, 1578, 27 USPQ2d 1129, 1131 (Fed. Cir. 1993).

Further, as pointed out by our reviewing court, we must first determine the scope of the claim. “[T]he name of the game is the claim.” In re Hiniker Co., 150 F.3d 1362, 1369, 47 USPQ2d 1523, 1529 (Fed. Cir. 1998). Therefore, we look to the limitations as recited in independent claim 6192.

We find that the limitations of independent claim 6192 do not recite any functional interaction between the lithography track and the spectroscopic ellipsometer more than a mere coupling of some unspecified nature. Further, each of the subsystems functions independently of the other, but both subsystems have a relation to the same specimen. Additionally, the Examiner has set forth the claim interpretation that the ellipsometer of Moore would have been a spectroscopic ellipsometer. (Answer, pp. 17-18). We agree with the Examiner since the ellipsometer of Moore would have taken multiple measurements within the spectrum and not merely work within a limited range.

Additionally, the Examiner maintains that the interpretation given to the term is consistent with the “definition” at page 139 of Appellants’ specification. (Answer, p. 18). While we agree with the Examiner that the Examiner’s interpretation is consistent with Appellants’ usage at page 139,

we find that Appellants have not set forth an express definition of “spectroscopic ellipsometer” in the specification or in the prosecution history. Appellants reply that the specification at a number of locations defines the term “spectroscopic ellipsometer.” We cannot agree with Appellants. We find that the portions of the specification identified by Appellants merely set forth specific examples and possible facets of interpretations amongst the voluminous combinations of elements and subsystems that “may” or “can” be present in the combination of elements to make an in-process measurement of quality control parameter(s) of a semiconductor being manufactured in the lithographic process during the dead time between sub-steps of the manufacturing.

We find that Appellants’ specification does not expressly define the term “spectroscopic ellipsometer” in the specification at the recited locations. We find that those sections of the specification set forth some facets that a spectroscopic ellipsometer could have, and not that they are required to have those specific facets. Therefore, we disagree with Appellants’ argument that the ellipsometer of Moore is used for discrete measurements in the optical spectrum and is not a spectroscopic ellipsometer.

Furthermore, Appellants have not identified any other language in independent claim 6192 that would require a narrower interpretation than the Examiner has made. Hence, we do not find that the Examiner has applied an unreasonable interpretation of independent claim 6192 when applying the prior art against the claim. Here, we find an issue of greater breadth than Appellants may have intended/desired rather than an issue of unreasonable claim interpretation.

With the above claim interpretation, we find that the Examiner has set forth sufficient teachings, analysis, and a convincing line of reasoning for the combination of the teachings that it would have been obvious to one skilled in the art at the time of the invention to have combined the teachings as set forth by the Examiner in the Answer.

Appellants argue that Moore discloses an ellipsometer coupled to a cluster tool, but does not teach or suggest a spectroscopic ellipsometer coupled to a cluster tool. Appellants further argue that as known to one of ordinary skill in the art that an ellipsometer is not equivalent to a spectroscopic ellipsometer. (Brief, p. 7). We disagree with Appellants as discussed above with respect to the Examiner's claim interpretation. We do not find that Appellants have provided any evidence beyond the cited portions of the specification and the definition from the Internet which has no date associated with it. (Brief, pp. 8-9). Therefore, we do not find that Appellants have provided any evidence which we find persuasive.

Appellants argue that Moore discloses an ellipsometer that includes a light source that is known to one of ordinary skill in the art that can operate at one or more discrete wavelengths, not a broad spectrum of wavelengths. (Brief, p. 9). We disagree with Appellants as discussed with respect to the claim interpretation. We find that the fact that more than one wavelength at which the ellipsometer can operate would have made the ellipsometer a spectroscopic ellipsometer in a broad sense.

While Appellants would like the claim terminology to be interpreted to require a "broad spectrum of wavelengths," we find no additional limitation in the language of independent claim 6192 which requires that level of

specificity and to so interpret the claim language would be to import limitations to the claim, which we cannot do.

Appellants additionally argue that Moore fails to teach or suggest measuring ellipsometric parameters of a substrate or a layer as a function of wavelength and that the ellipsometer of Moore includes single wavelength-type optical components (Brief, p. 10). We do not find this argument persuasive since we find the language of claim 6192 merely recites “spectroscopic ellipsometer is configured to generate one or more output signals responsive to the at least one property of the specimen during use.” We find no language which supports Appellants argument. Therefore, Appellants' argument is not persuasive, and we will sustain the rejection of claim 6192 and independent claims 6252, 6312, 6432, 6492, and 6548 and dependent claims 6193-6196, 6203-6211, 6214-6215, 6217-6220, 6222, 6230-6232, and 6243-6251, which Appellants have chosen to group therewith.

With respect to dependent claim 6199, the Examiner cites to columns 3 and 5 of Moore to teach and suggest that the system determines thickness and adjusts the process which would have involved the processor (Answer, pp. 6, 18, and 19). Appellants argue that Moore does not teach a processor configured to determine defects on a specimen (Brief, p.11). We disagree with Appellants, and we will sustain the rejection of claim 6199.

With respect to dependent claim 6201 and 6202, Appellants argue that the cited art does not teach or suggest a spectroscopic ellipsometer which is configured to image at least an area of a specimen so that a property of the specimen can be determined at multiple locations substantially

simultaneously (Brief, pp. 1-12). The Examiner sets forth a rationale for why Moore would teach or fairly suggest the measurement at multiple locations of the specimen at substantially the same time (Answer, p. 19). We do not find that Appellants have rebutted the Examiner's position, and Appellants rely upon the language of the limitation without further argument. We find that Appellants have not identified why the Examiner is in error in the prima facie case. Therefore, Appellants' argument is not persuasive, and we will sustain the rejection of claims 6201 and 6202.

With respect to dependent claims 6212 and 6213, we find that the Examiner has not elaborated upon the statement of the rejection in the Answer in response to Appellants' argument. From our review of the language of claim 6212 and Appellants' argument at pages 12-13 of the Brief, we agree with the Examiner's rejection. We find that the language of dependent claim 6212 recites "a stage coupled to the spectroscopic ellipsometer is configured to move the specimen from the spectroscopic ellipsometer to the lithography track during use" and that the stage is not required to move the specimen from one chamber to the other. Here, all that is required is that the stage is configured to move. We find that the stage and the robot arm are configured to work together to carry out and complete the movement of the specimen. Therefore, Appellants' argument is not persuasive, and we will sustain the rejection of claims 6212 and 6213.

With respect to 6216, Appellants argue that the Examiner erred in relying upon the upper surface of the robot to teach the support device. (Brief, p. 13 and Reply Brief, pp. 1-2). We agree with Appellants and find that the Examiner has not explained how the robot of Moore supports the

specimen in the at least one step in the lithograph track and additionally how and why the upper surface would be perpendicular to the upper surface of the stage in the spectroscopic ellipsometer. Therefore, the Examiner has not established a prima facie case of obviousness and we cannot sustain the rejection of dependent claim 6216.

With respect to dependent claim 6221, Appellants argue the teachings in Figure 12 of Yoshioka in the Brief at page 14, but the Examiner relies upon the teachings of Yoshioka in Figure 6 which teaches evaluation of the line width to determine if line width is within the allowable range and to thereby end the process. (Answer, p. 20). Appellants argue that the measurement of the line width of the latent image is performed after the light exposure treatment and before any other processing of the wafer. (Reply Brief, p. 2).

Appellants argue:

As such, since the measurements are not performed during a step performed by the lithography track (i.e., the measurements are performed between steps), these measurements cannot be used to obtain a signature characterizing such a step that includes at least one singularity representative of an end of the step (since the step has ended before the measurements begin). . . Therefore, the "End" of the step of Yoshioka referred to in the Examiner's Answer is not a step performed on a specimen by a lithography track. Instead, the step that may be "ended" in the method shown in Fig. 6 of Yoshioka is a data processing operation performed by the CPU on the measured value of the line width. A data processing step is not a specimen processing step as presently claimed. As a result, contrary to the assertion in the Examiner's Answer, the cited art does not read on all limitations of claim 6221.

From our review of the Examiner's rejection and the language of dependent claim 6221, we find that the Examiner has established a prima facie of obviousness of "the processor is further configured to obtain a signature characterizing at least one of the one or more steps during use, and wherein the signature comprises at least one singularity representative of an end of the at least one of the one or more steps" as recited in dependent claim 6221. Here, we do not find Appellants' argument persuasive that the measurement and the data processing are performed between specific processing steps within the lithographic track. We find no limitation to detail the processes or whether the steps of the lithographic track are all chemical processes or whether one step may be deemed a data processing step. Here, we agree with the Examiner that the data processing falls within the lithographic process and the data processing is used to determine aspects of the quality of the specimen. An "end" of a portion of the processing is determined based on an analysis of the image which we find to be a signature as recited in the language of the claim. Therefore, Appellants' argument is not persuasive, and we will sustain the rejection of claim 6221.

With respect to dependent claims 6223-6229, Appellants argue that Moore does not teach or suggest that the stage of the spectroscopic ellipsometer moves the specimen between process chambers and the spectroscopic ellipsometer is configured to generate at least one output signal as the stage is moving the specimen between chambers. (Brief, pp. 15-16). We agree with Appellants and find that the Examiner has not identified a specific teaching to teach or suggest the express limitations of

dependent claim 6223. Therefore, we cannot sustain the rejection of dependent claim 6223 and dependent claims 6224-6229.

With respect to dependent claim 6233, we will address this claim separately from the remainder of Appellants' grouping (with dependent claims 6234 and 6235) since Appellants have specifically argued the limitations therein. Appellants argue that Yoshioka and Moore do not teach or suggest a processor configured to alter a parameter of the spectroscopic ellipsometer. (Brief, p. 16). We agree with Appellants, and we find that the portions of Moore and Yoshioka identified by the Examiner do not support the Examiner's position and further do to teach or suggest altering a parameter of the spectroscopic ellipsometer rather than a parameter of the lithographic processes. Therefore, we will not sustain the rejection of claim 6233.

With respect to dependent claim 6234 and 6235, we differentiate these claims from 6233 since these claims do not specifically limit the parameter to be associated with altering a parameter of the spectroscopic ellipsometer. Rather, the instruments coupled to the spectroscopic ellipsometer may be part of the lithographic processes which is how the Examiner applied the art in the statement of the rejection. We find no argument to this specific language in Appellants' claims. Therefore, Appellants' argument is not persuasive, and we will sustain the rejection of claims 6234 and 6235.

With respect to dependent claim 6236, Appellants argue that Yoshioka and Moore do not teach or suggest a processor configured to generate a database that includes at least a property of a specimen. (Brief, p. 17). Appellants argue that the data of Moore does not inherently have to be part

of a database that includes at least one property of a specimen. (Reply Brief, p. 2-3). While we agree with Appellants that the data used to adjust the processes in Moore need not be part of a database, we find that it would have been obvious to one skilled in the art at the time of the invention that the data would have been most useful in some organized fashion, such as a database. We find no limitations as to the structure or organization of the data in the database with which to distinguish the database or data. Additionally, we find that the set data of Yoshioka would have been in some organized database so as to optimize the use thereof as the Examiner maintains at pages 13, 14, and 21 of the Answer. Therefore, Appellants' argument is not persuasive, and we will sustain the rejection of claims 6236 and dependent claims 6237-6240 grouped therewith.

With respect to dependent claims 6241 and 6242, Appellants argue that that Yoshioka and Moore do not teach or suggest a stand alone system coupled to the system which is configured to be calibrated with a standard and to calibrate the system. (Brief, p. 18). The Examiner maintains that the set data and the product wafer W or dummy wafer DW and corrections thereto for changes in variable parameters would have been a calibration. (Answer, pp. 21-22). We agree with the Examiner and find that the language of dependent claim 6241 does not further identify how the calibration is performed. Therefore, Appellants' argument is not persuasive, and we will sustain the rejection of claim 6241 and claim 6242 which is grouped therewith.

With respect to dependent claim 6197, we find that Appellants rely on the arguments made with respect to independent claim 6192 and address the

teachings of Jann separately from the combined teachings of Yoshioka and Moore since Jann does not specifically relate to a spectroscopic ellipsometer. (Brief, p. 19). We do not find a specific argument by Appellants which shows an error in the Examiner's prima facie of obviousness set forth at pages 5-6 of the Answer. Furthermore, Appellants have not identified why it would not have been obvious to one skilled in the art at the time of the invention to have included a roughness measurement in the combination. Therefore, Appellants' argument is not persuasive, and we will sustain the rejection of claim 6197.

With respect to dependent claim 6198, for the same reasons as discussed above with respect to dependent claim 6197, we will sustain the rejection of dependent claim 6198.

With respect to dependent claim 6200, the Examiner maintains that Kuriyama teaches the motivation and ability to measure multiple properties of a specimen substantially simultaneously. (Answer, p. 7). Appellants rely on the arguments made with respect to independent claim 6192 and that Kuriyama does not teach that the two optical systems are not configured as a spectroscopic ellipsometer. We do not find these arguments persuasive since they do not address the base motivation to perform more than one determination at a time. Here, we note that dependent claim 6200 does not require multiple measurement systems performing measurements simultaneously as the Examiner applies Kuriyama, but only that the system "determines at least two properties" substantially at the same time. We find that if there are two measurements at the same time there would have been

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two determinations at the same time. Therefore, Appellants' argument is not persuasive, and we will sustain the rejection of claim 6200.

CONCLUSION

To summarize, we have sustained the rejection of claims 6192-6215, 6217-6222, 6230-6232, 6234-6252, 6312, 6432, 6492, and 6548 under 35 U.S.C. § 103, and we have not sustained the rejections of dependent claims 6216, 6223-6229, and 6233 under 35 U.S.C. § 103.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

JOSEPH L. DIXON)	
Administrative Patent Judge)	
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