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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* SHOGO OKITA and SUMIO MIYAKE

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Appeal 2017-011615  
Application 13/699,920  
Technology Center 1700

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Before KAREN M. HASTINGS, JENNIFER R. GUPTA,  
and MICHAEL G. McMANUS, *Administrative Patent Judges*.

McMANUS, *Administrative Patent Judge*.

DECISION ON APPEAL

The Examiner finally rejected claims 1–5, 7 and 8 of Application 13/699,920 under pre-AIA 35 U.S.C. § 103(a). Final Act. (Sept. 30, 2016), 2–4. Appellants<sup>1</sup> seek reversal of these rejections pursuant to 35 U.S.C. § 134(a). We have jurisdiction under 35 U.S.C. § 6(b).

For the reasons set forth below, we AFFIRM.

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<sup>1</sup> Panasonic Intellectual Property Management Co., Ltd., is identified as the real party in interest. Appeal Br. 1.

## BACKGROUND

The present application generally relates to the processing of wafers of the type used in the manufacture of integrated circuits. Spec. ¶ 1–2.<sup>2</sup> In the course of manufacture, such wafers may be subject to plasma processing. *Id.* Prior to being conveyed to the processing chamber, the wafers are held in a tray having several “accommodation holes.” The tray (including the wafers) is placed on a support pedestal (also referred to as a susceptor). *Id.* ¶ 3. This is shown in Figure 11B, reproduced below.

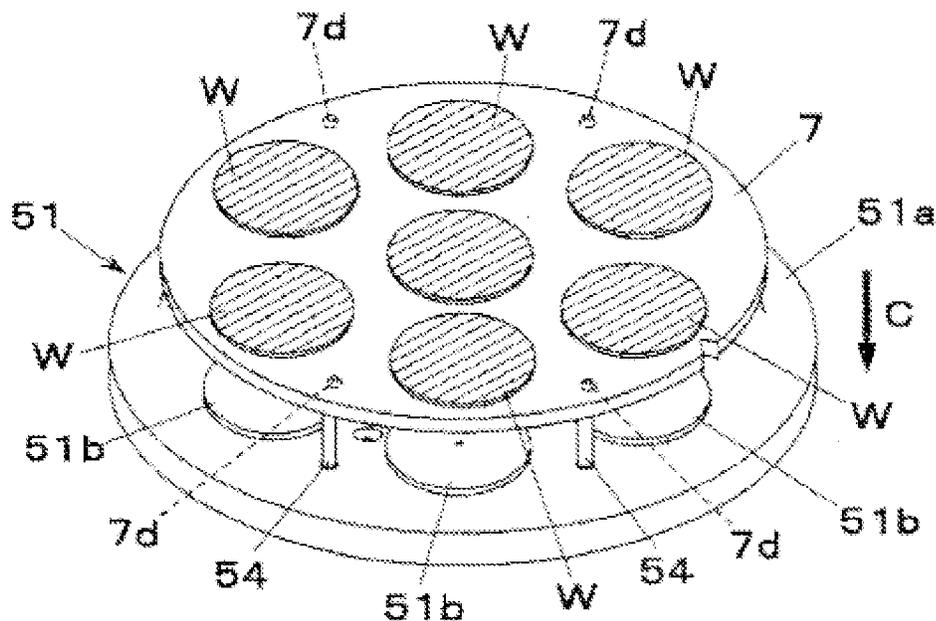


Figure 11B shows tray 7 being placed on susceptor 51 in the processing chamber. *Id.* ¶ 21.

Cylindrical columns (wafer holding portions 51b) of the support pedestal protrude through the wafer such that “the wafer W accommodated

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<sup>2</sup> References to the Specification (or “Spec.”), are to the Specification as filed November 26, 2012.

in each accommodation hole 7a of the tray 7 is held so as to float above the tray 7 by the wafer holding portion 51b entering in each accommodation hole 7a from below.” *Id.* ¶ 48. Where, however, there is an accommodation hole with no wafer, the wafer holding portion which lacks a wafer is directly exposed to plasma. *Id.* ¶ 5. The Specification teaches that “[w]hen the wafer holding portion is exposed to the plasma, not only the wafer holding portion but also the entire plasma processing apparatus may be damaged.” *Id.*

The Specification teaches that “an object of the present invention is to provide a plasma processing apparatus that can prevent the wafer holding portion of the support pedestal from being directly exposed to plasma from any accommodation hole of the tray where no wafer is present.” *Id.* ¶ 6. Accordingly, the Specification teaches a plasma processing apparatus that includes “a wafer presence-absence detecting unit that detects whether or not the wafer is present in each of the accommodation holes of the tray.” *Id.* ¶ 7. Such detection may occur “while the tray is rotated by the rotary table.” *Id.* ¶ 14.

Claim 1 is illustrative of the subject matter on appeal and is reproduced below with certain language bolded for emphasis:

1. A plasma processing apparatus, comprising:
  - a stock unit configured to supply and collect a conveyable tray accommodating a wafer in each of a plurality of accommodation holes penetrating through the tray in a thickness direction of the tray, the accommodation holes being arranged so as to surround a center of the tray;
  - a processing unit configured to perform plasma processing to each wafer accommodated in the tray supplied from the stock unit, the processing unit including:
    - a processing chamber; and

a susceptor accommodated in the processing chamber, the susceptor being configured to hold each wafer and the tray during plasma processing, the susceptor including a tray placing portion and a plurality of wafer holding portions, each of the wafer holding portions projecting upwardly from the tray placing portion and being configured to enter a respective one of the accommodation holes of the tray from below so as to lift and hold the respective wafer accommodated in the respective one of the accommodation holes;

an alignment unit including a rotary table on which the tray is placed before being subjected to the plasma processing, the rotary table being configured to rotate the tray within a horizontal plane around the center of the tray, and positioning of the tray on the rotary table being performed at the alignment unit;

a wafer presence-absence detecting unit configured to detect whether or not any wafer is present in each of the accommodation holes of the tray placed on the rotary table of the alignment unit;

a conveying mechanism configured to convey the tray accommodating the wafer in each of the plurality of accommodation holes from the stock unit to the rotary table of the alignment unit, and configured to convey the tray from the rotary table of the alignment unit to the susceptor of the processing unit; and

**a controller programmed to:**

continuously rotate the rotary table of the alignment unit so that the tray is continuously rotated around the center of the tray by the rotary table,

to control the wafer presence-absence detecting unit **to sequentially detect whether or not any wafer is present in each of the accommodation holes** arranged around the center of the tray **while the tray is being continuously rotated**, and

to convey the tray from the rotary table to the susceptor by the conveying mechanism **when the wafer presence-absence detecting unit detects a wafer is present in**

**each of the accommodation holes of the tray placed on the rotary table** so as to prevent the wafer holding portion from being directly exposed to plasma during the plasma processing.

Appeal Br. (Claims App. i–ii) (emphasis added).

## REJECTIONS

The Examiner maintains the following rejections:

1. Claims 1, 3, 5, 7, and 8 are rejected under 35 U.S.C. § 103(a) (pre-AIA)<sup>3</sup> as obvious over Mitani et al.<sup>4</sup> in view of Aikawa et al.,<sup>5</sup> Kato et al.,<sup>6</sup> and Okita et al.<sup>7</sup> Final Act. 2–4.
2. Claim 2 is rejected under 35 U.S.C. § 103(a) (pre-AIA) as obvious over Mitani in view of Aikawa, Kato, and Okita, and in further view of Ohsawa et al.<sup>8</sup> *Id.* at 4.
3. Claim 4 is rejected under 35 U.S.C. § 103(a) (pre-AIA) as obvious over Mitani in view of Aikawa, Kato, and Okita, and in further view of Jacob.<sup>9</sup> *Id.*

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<sup>3</sup> Because this application was filed before the March 16, 2013, effective date of the America Invents Act, we refer to the pre-AIA version of the statute.

<sup>4</sup> US 2010/0248458 A1, published Sept. 30, 2010 (“Mitani”).

<sup>5</sup> US 2010/0124610 A1, published May 20, 2010 (“Aikawa”).

<sup>6</sup> US 2010/0055312 A1, published Mar. 4, 2010 (“Kato”).

<sup>7</sup> US 2009/0255901 A1, published Oct. 15, 2009 (“Okita”).

<sup>8</sup> US 5,645,391, issued July 8, 1997 (“Ohsawa”).

<sup>9</sup> US 5,796,486, issued Aug. 18, 1998 (“Jacob”).

## DISCUSSION

Appellants do not present separate argument concerning each of the foregoing rejections; rather, they rely upon their arguments presented in regard to claim 1 (the sole independent claim). Appeal Br. 8. Accordingly, the remaining claims at issue will stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Appellants present two arguments for the patentability of claim 1. First, they argue that the cited references do not teach a controller programmed to detect a wafer “while the tray is being continuously rotated.” Appeal Br. 4–6. Second, Appellants argue that the cited references do not teach an apparatus that conveys a tray to the susceptor when the wafer presence-absence detecting unit detects a wafer is present in each of the accommodation holes of the tray. *Id.* at 6–8. We consider these arguments in sequence.

### *Wafer Detection While the Tray is “Continuously Rotated”*

In the Final Rejection, the Examiner finds that the primary reference, Mitani, “is silent regarding the feature of a presence-absence detector.” Final Act. 2. The Examiner finds that Aikawa teaches a detector such as a video camera disposed above the chamber to assess the position of each wafer. *Id.* at 2. The Examiner, however, also finds that the device of Aikawa “indexes the tray during wafer detection rather than continuously rotating the tray, as is claimed.” *Id.* at 3. The Examiner further finds that “[e]ven so, this latter technique [detection during continuous rotation] is known in the art. Kato, for instance, disposes a camera above a substrate tray so as to monitor its alignment during rotation.” *Id.*

The Examiner finds that a person of ordinary skill in the art would have known that one could combine the process of monitoring during continuous rotation as taught by Kato with the video camera used for wafer position detection as taught by Aikawa. *Id.* The Examiner concludes that “it would have been obvious to program Aikawa’s controller to continuously rotate the tray during the assessment period to procure substantial efficiency gains.” *Id.*

Appellants assert error on several bases. Appellants argue that Aikawa teaches a camera programmed “to detect the *center position* of each wafer W, rather than simply detecting the *presence of* a wafer W in the ‘accommodation hole’ 24.” Appeal Br. 5. (emphasis in original). This argument is not persuasive. As determined by the Examiner, “the act of assessing wafer position, by definition, presupposes the detection of wafer presence.” Answer 3.

Appellants also argue that the Examiner’s finding regarding the video camera of Aikawa is unsupported. The Examiner finds that “Aikawa’s video camera is capable of effectively imaging the rotary table in either case, indexed or continuous.” Final Act. 3. Appellants argue that the “primary objective of the Aikawa reference is effective reduction of detection errors.” Appeal Br. 6. Appellants further argue that, as a consequence, “[t]his emphasis on accuracy appears to be at odds with the Examiner’s suggestion that one of ordinary skill in the art would modify the teachings of the Aikawa reference to provide detection during continuous rotation so as to ‘augment efficiency.’” Appeal Br. 6.

This argument does not rebut the Examiner’s determination that one of skill in the art would have been motivated to increase the efficiency of the detection process. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165

(Fed. Cir. 2006) (“A given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.”) Further, the Examiner determines that Aikawa teaches, as one option, to use a charge-coupled device (CCD) camera. *See* Aikawa ¶ 54. Similarly, the Examiner finds that the Specification teaches to use a CCD camera for wafer detection. Answer 3–4; Spec. ¶ 79. The Examiner reasons that Aikawa teaches a camera to detect wafers in an efficient and error-free manner to the same extent as the Specification. We discern no error in this reasoning. Nor does any teaching of Aikawa regarding accuracy amount to a “teaching away” from continuous detection.

*Conveying a Tray to the Susceptor When the Wafer Detecting Unit Detects a Wafer is Present in Each Accommodation Hole*

Appellants additionally argue that the cited references do not teach an apparatus that conveys a tray to the susceptor only when the wafer presence-absence detecting unit detects a wafer is present in each of the accommodation holes of the tray. *Id.* at 6–8. That is, Appellants argue that the references do not teach the following limitation:

a controller programmed . . .  
to convey the tray from the rotary table to the susceptor  
by the conveying mechanism when the wafer presence-absence  
detecting unit detects a wafer is present in each of the  
accommodation holes of the tray placed on the rotary table so  
as to prevent the wafer holding portion from being directly  
exposed to plasma during the plasma processing.

Appeal Br. (Claims App. i–ii). The Examiner finds that Mitani teaches this limitation as follows:

Given that Mitani’s purpose is to fully load each tray with wafers, claim 1’s final paragraph becomes tautological in the

sense that it will be satisfied in every case. As the prior art is accorded the assumption of full operability, the detecting unit will always already encounter a tray that is fully loaded, at which point the tray is conveyed to a susceptor for plasma processing, as the claim requires.

Final Act. 3. The limitation at issue implies, but does not require, that the tray will not be conveyed to the susceptor when the detector fails to detect a wafer in each accommodation hole.

During examination, claims are given their broadest reasonable interpretation consistent with the specification. *See In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). “Construing claims broadly during prosecution is not unfair to the applicant . . . because the applicant has the opportunity to amend the claims to obtain more precise claim coverage.” *Id.* Accordingly, the limitation quoted above is construed to require only detection of a wafer in each accommodation hole and conveying the tray to the susceptor. *See Ex Parte Schulhauser*, No. 2013–007847, 2016 WL 6277792, at \*4 (PTAB Apr. 28 2016) (informative) (“The Examiner did not need to present evidence of the obviousness of the remaining method steps of claim 1 that are not required to be performed under a broadest reasonable interpretation of the claim”).

Appellants argue that Mitani does not teach fully loading each tray. Appeal Br. 7. This position is not well supported. The Examiner cites Mitani’s teaching that “the susceptor S . . . has 4 substrate mounting portions  $S_{ws}$  on which 4 substrates  $W$  can be respectively mounted at once.” Answer 5 (citing Mitani ¶ 28) (emphasis added). The Examiner further determines that Aikawa teaches wafer detection. Answer 3 (determining that wafer detection occurs in conjunction with wafer position assessment).

In addition, although beyond the scope of claim 1 as construed, we note that Aikawa teaches to suspend operations if the center of the wafer is not determined to be within a defined position. *See* Aikawa, Fig. 2 (Step 25).

Accordingly, we determine that Appellants have failed to show reversible error in this regard.

#### CONCLUSION

The rejections of claims 1–5, 7 and 8 are affirmed.

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

AFFIRMED