

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte JOSEPH R. LITTLE

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Appeal No. 2006-0121  
Application No. 09/542,782

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ON BRIEF

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Before HAIRSTON, DIXON and SAADAT, Administrative Patent Judges.  
SAADAT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the Examiner's final rejection of claims 1-60, which are all of the claims pending in this application.

We affirm-in-part.

BACKGROUND

Appellant's invention relates to identification of marks or indicia formed in substrates, such as semiconductor wafers, covered by one or more opaque material layers.

Representative independent claims 1 and 21 are reproduced as follows:

1. A method for identifying a type of semiconductor device being fabricated on a substrate by evaluating a mark comprising at least one recess in the substrate surface through at least one layer formed over the mark, comprising:

scanning electromagnetic radiation of at least one wavelength across at least a portion of the substrate including the at least one recess, the at least one wavelength capable of at least partially penetrating a material substantially opaque to at least some wavelengths of electromagnetic radiation;

measuring an intensity of radiation of the at least one wavelength reflected by different locations of the at least a portion of the substrate;

detecting locations at which the intensity changes from substantially a baseline intensity; and

correlating each location at which the intensity changes to at least one characteristic which distinguishes the mark from other marks on or in the substrate and to identify the type of semiconductor device being fabricated on the substrate.

21. A method for determining a destination for a semiconductor device substrate, comprising:

identifying a mark comprising at least one recess within a surface of the semiconductor device substrate and covered with at least one layer of material substantially

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opaque to at least some wavelengths of electromagnetic radiation by radiation by:

scanning electromagnetic radiation of at least one wavelength across at least a portion of the semiconductor device substrate including the at least one recess, the at least one wavelength capable of at least partially penetrating the material;

measuring an intensity of radiation of the at least one wavelength reflected by different locations of the at least a portion of the semiconductor device substrate;

detecting locations at which the intensity changes from substantially a baseline intensity; and

correlating each location at which the intensity changes to identify the mark; and

identifying a predetermined destination for the semiconductor device substrate based on the mark.

The following references are relied on by the Examiner:

Duncan et al. (Duncan)	4,585,931	Apr. 29, 1986
Noguchi	5,361,150	Nov. 1, 1994
Pramanik et al. (Pramanik)	5,852,497	Dec. 22, 1998
Bareket	5,889,593	Mar. 30, 1999

Claims 21, 23, 32, 33 and 36-38 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Pramanik.

Claims 41 and 49-54 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Noguchi.

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Claims 1-3, 6-18, 22, 26-31, 34 and 35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pramanik and Noguchi.

Claims 4, 5, 19, 20, 24, 25, 39 and 40 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pramanik, Noguchi and Bareket.

Claims 42-48 and 55-58 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Noguchi and Duncan.

Claims 59 and 60 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bareket and Noguchi.

Rather than reiterate the opposing arguments, reference is made to the briefs and answer for the respective positions of Appellant and the Examiner. Only those arguments actually made by Appellant have been considered in this decision. Arguments which Appellant could have made but chose not to make in the briefs have not been considered (37 CFR § 41.37(c)(1)(vii)).

#### OPINION

With respect to the 35 U.S.C. § 102 rejection of claims 21, 23, 32, 33 and 36-38, Appellant argues that, instead of determining the next destination for a wafer, the method of Pramanik merely determines the orientation of the alignment structures when the wafer is already at the desired destination

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(brief, page 9). Appellant further argues that Pramanik includes no express or inherent description of the step of identifying a predetermined destination for the wafer based on an identity of a mark (brief, page 10). The Examiner responds by stating that the term "destination" includes a particular location within a system such as the proper alignment of a wafer within the manufacturing component (answer, page 15) which is predetermined since the alignment is already known (answer, page 16). Appellant questions the Examiner's characterization of "alignment" as "orientation" and states that the wafer may be already at a particular destination where the proper orientation is attained by rotating the wafer (reply brief, page 2).

We agree with Appellant that Pramanik's determining the proper orientation of a wafer is not the same as the claimed identifying a predetermined destination. A rejection for anticipation under Section 102 requires that each and every limitation of the claimed invention be disclosed in a single prior art reference. In re Paulsen, 30 F.3d 1475, 1478-79, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994). See also Atlas Powder Co. v. Ireco Inc., 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999). Here, we observe that Pramanik merely uses the alignment mark for positioning the wafer with respect to a stepper after

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the wafer is already at its destination and placed in the stepper during the photolithography process (col. 1, lines 25-30). Therefore, as asserted by Appellant, there is no express or inherent teaching in Pramanik to indicate that a predetermined destination is identified based on the identified mark. It should be noted that although one of ordinary skill in the art could have identified a predetermined destination for the wafer after the mark is identified, we do not need to consider such modification as the rejection before us is not one under 35 U.S.C. § 103.

In view of the discussion above, we find that the claimed steps of "identifying a predetermined destination ... based on the mark" is absent in the method for detecting the alignment mark of Pramanik. Accordingly, since the Examiner has failed to meet the burden of providing a prima facie case of anticipation, the 35 U.S.C. § 102 rejection of claims 21, 23, 32, 33 and 36-38 over Pramanik cannot be sustained.

Next, we turn to the 35 U.S.C. § 102 rejection of claims 41 and 49-54. Appellant merely argues that Noguchi lacks any inherent description of a system with a radiation source configured and positioned to direct a wavelength to penetrate a material that is opaque to at least some electromagnetic

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radiation wavelengths (brief, page 11). In that regard, Appellant points out that Noguchi (col. 5, lines 16-18) senses the marking features through materials that are at least about 90% transparent to a visible wavelength (reply brief, page 3).

The Examiner responds by pointing to the use of sensors in Noguchi (col. 5, lines 12-25) for identifying the marking by directing electromagnetic radiation of at least one wavelength capable of at least partially penetrating the glass layers on the substrate (answer, page 16). The Examiner further asserts that such materials are also substantially opaque to at least some wavelengths of electromagnetic radiation, as described in the above-mentioned portion of Noguchi (id.).

After reviewing Noguchi, we find that the Examiner presents sufficient evidentiary support to establish a prima facie case of anticipation. Noguchi discloses that the sensor devices respond to light which may have different ranges of wavelengths (col. 5, lines 12-15). Among the substrate materials taught by Noguchi is glass which is substantially (90%) transparent for electromagnetic radiation having wavelengths not less than 350 nm (col. 5, lines 15-18) while chromium "hardly transmits these lights" (col. 5, lines 18-20). Therefore, the glass layer which

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apparently covers the chromium, is transparent to some wavelength and opaque to others.

Additionally, we do not agree with Appellant that Noguchi does not expressly or inherently teach the claimed features related to the radiation source for providing a wavelength capable of at least partially penetrating the layer that is substantially opaque to some other wavelength. In that regard, while lights having wavelengths greater than 350 nm penetrate the glass layer, it is substantially opaque to much smaller wavelengths. Thus, the Examiner has properly read the claimed features on the transmission properties of the materials forming and covering the identification mark in Noguchi.

In view of the analysis above, we find that the examiner has met the burden of providing a prima facie case of anticipation as Noguchi teaches all the elements recited in Appellant's claim 41. Accordingly, we affirm the rejection of claim 41 as well as claims 49-54, which are argued by Appellant (brief, page 12) as one group with claim 41, under 35 U.S.C. § 102 over Noguchi.

Turning now to the 35 U.S.C. § 103 rejection of claims 1-3, 6-18, 22, 26-31, 34 over Pramanik and Noguchi, Appellant argues that Noguchi teaches away from the combination because it limits the layers covering a marking to visibly transparent materials

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(brief, page 14; reply brief, page 5). Appellant further points out that given such disclosure, one of ordinary skill in the art would not have used such transparent layer in conjunction with Pramanik who, similar to the claimed subject matter, detects markings through a layer which is opaque to at least some wavelengths of electromagnetic radiation (id.).

In response to Appellant's arguments, the Examiner asserts that the combination of the references is based on Noguchi's disclosure related to detecting the markings on the substrate for identification purposes (answer, page 17). The examiner further points out that the combination is proper since using layers of material which are opaque to some wavelengths of electromagnetic radiation is already disclosed in Pramanik (id.).

From our review of Pramanik and Noguchi, we remain unconvinced by Appellant's arguments that any error in the Examiner's determination regarding the obviousness of the claimed subject matter has occurred. 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.

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See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Furthermore, the test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art. See In re Young, 927 F.2d 588, 591, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991).

Here, both references are concerned with identification of marks already processed onto the substrate that would determine subsequent processes required for that substrate. Pramanik provides for identification of marks by detecting their edges formed in the substrate and covered by a silicon dioxide layer 204 and a polysilicon layer 210 (col. 4, lines 27-39). The edge detection through the polysilicon layer, which is opaque to visible light (col. 4, lines 50-57), is performed by selecting a specific wavelength according to its relationship with the polysilicon thickness (col. 5, lines 27-39). Noguchi, similarly determines the identity of the substrate by detecting the markings on the substrate using the specific wavelength that at least partially penetrates the layer covering the marks. Although the wavelengths specified in Noguchi may not be the same as those used in Pramanik, the use of such markings in identification of the substrate is clearly suggested.

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Thus, based on the portions of the prior art relied upon by the Examiner (answer, page 17), the advantages described by Noguchi would have motivated one of ordinary skill in the art to design and use the marks in Pramanik for identification purposes as well as alignment of subsequent mask layers. Accordingly, as the Examiner has established a prima facie case of obviousness with respect to claim 1, we sustain the 35 U.S.C. § 103(a) rejection of claim 1, as well as claims 2-3, 6-18, 22, 26-31, 34, argued therewith as one group (brief, page 14) over Pramanik and Noguchi.

Regarding the 35 U.S.C. § 103 rejection of claims 4, 5, 19, 20, 24, 25, 39 and 40 over Pramanik, Noguchi and Bareket, Appellant merely relies on the same arguments made with respect to the combination of Noguchi with Pramanik (brief, page 15). As discussed above, we find the Examiner's reliance on the combination of the references to be reasonable and sufficient to support a prima facie case of obviousness. Therefore we sustain the 35 U.S.C. § 103 rejection of claims 4, 5, 19, 20, 24, 25, 39 and 40 over Pramanik, Noguchi and Bareket.

Similarly, with respect to the rejection of claims 42-48 and 55-58, Appellant relies on the same argument made for base claim 41 (brief, page 15). As outlined above, we do not find any error

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in the Examiner's reasoning and therefore sustain the 35 U.S.C. § 103 rejection of claims 42-48 and 55-58 over Noguchi and Duncan.

Finally, turning to the 35 U.S.C. § 103 rejection of claims 59 and 60 over Bareket and Noguchi, Appellant argues that the references fail to teach comparing a measured intensity of reflected radiation to a baseline intensity reflected from a "planar surface of the substrate" (brief, page 16; reply brief, page 5). Appellant asserts that since the prior art uses conventional optical recognition systems, a planar portion of a substrate is not used as a reference point (brief, page 17; reply brief, page 6).

The Examiner refers to Bareket's use of a library of stored curve families (col. 7, lines 56-57) as reference data that represents values of the reflected radiation off a "planar" portion of the substrate (answer, page 18). The Examiner also argues that the reference data represents the "baseline" intensity" taken from a planar portion since it is compared to the actual measured data (id.).

After reviewing Bareket, we also remain unconvinced by Appellant that the Examiner's reasoning is in error. Bareket generally relates to optical systems for measuring dimensions

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such as width or thickness or profile of features, such as deposited or etched lines formed on a surface of a wafer (col. 1, lines 7-10). In the specific portions relied on by the Examiner, the reference does disclose baseline measurements from featureless and planar parts of the wafer as a library of stored curve families to be used by the processor for carrying out a least mean square fit of the measured intensities (col. 7, lines 55-58). Bareket also compares the measured reflectance to a baseline from the library of curve families depending on the desired characteristic parameter (recited in claim 10, col. 11, lines 53-58). Since Appellant has neither identified any clear flaw in the reasoning of the Examiner, nor successfully pointed to any evidence of record indicating that the findings of the Examiner are unsupportable, we find the Examiner's reliance on the combination of the references to be reasonable and sufficient to support a prima facie case of obviousness. Therefore we sustain the 35 U.S.C. § 103 rejection of claims 59 and 60 over Bareket and Noguchi.

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CONCLUSION

In view of the foregoing, the decision of the Examiner to reject claims 21, 23, 32, 33 and 36-38 under 35 U.S.C. § 102 is reversed, but affirmed with respect to 35 U.S.C. § 102 rejection of claims 41, and 49-54 and 35 U.S.C. § 103 rejection of claims 1-20, 22, 24-31, 34, 35, 39, 40, 42-48, 55-58, 59 and 60.

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

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KENNETH W. HAIRSTON	)	
Administrative Patent Judge	)	
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	)	BOARD OF PATENT
Joseph L. DIXON	)	
Administrative Patent Judge	)	APPEALS AND
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	)	INTERFERENCES
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