

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

Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex Parte* AKIHITO TODA

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Appeal No. 1998-0078  
Application 08/478,814

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HEARD: February 15, 2001

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Before, OWENS, JEFFREY T. SMITH and PAWLIKOWSKI, *Administrative Patent Judges*.

JEFFREY T. SMITH, *Administrative Patent Judge*.

*Decision on appeal under 35 U.S.C. § 134*

Applicant appeals the decision of the Primary Examiner finally rejecting claims 26 and 27. We have jurisdiction under 35 U.S.C. § 134.

**BACKGROUND**

The invention is directed to etching equipment that etches a semiconductor wafer. The equipment includes an etching apparatus for main etching, a post processing apparatus for removing a resist film remaining on the etched object after the main processing and a means for transferring the object between the etching apparatus and the post processing apparatus. The post processing apparatus is capable of both light etching and ashing the etched object by switching between two gas supply sources. Claim 26 and 27 are attached as an appendix to this decision.

In determining patentability of the claimed subject matter, the Examiner relies on the following references:

Otsubo et al. (Otsubo)	4,479,848	Oct. 30, 1984
Savage	5,014,217	May 7, 1991
Maher et al. (Maher)	5,344,542	Sep. 6, 1994 (filed Dec. 16, 1991)
Amemiya et al. (Amemiya)	5,385,624	Jan. 31, 1995 (filed Nov. 29, 1991)

### ***THE REJECTIONS***

The Examiner entered the following grounds of rejection:

Claims 26 and 27 are rejected as unpatentable under 35 U.S.C. § 112, second paragraph. (Examiner's Answer, page 3).

Claim 26 is rejected as unpatentable under 35 U.S.C. § 102(e) as anticipated by Amemiya. (Examiner's Answer, page 3).

Claim 26 is rejected as unpatentable under 35 U.S.C. § 102(e) as anticipated by Maher. (Examiner's Answer, page 4).

Claim 27 is rejected as unpatentable under 35 U.S.C. § 103 over Amemiya in view of Savage. (Examiner's Answer, page 4).

Claim 27 is rejected as unpatentable under 35 U.S.C. § 103 over Maher in view of Savage or Otsubo. (Examiner's Answer, page 5).

### ***OPINION***

We have carefully reviewed the claims, specification and applied prior art, including all of the arguments advanced by both the Examiner and Appellant in support of their respective positions. This review leads us to conclude that none of the rejections are well founded. Accordingly, we will reverse the § 112, second paragraph, § 102 and § 103 rejections. Our reasons for this conclusion follow.

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Rejection Under 35 U.S.C. § 112, Second Paragraph

The Examiner has rejected claims 26 and 27 as unpatentable under 35 U.S.C. § 112, second paragraph as indefinite. According to the Examiner, claim 26 “recites process steps, not an apparatus capable of performing those process steps and is therefore confusing since the claim is directed towards an apparatus.” (Examiner’s Answer, page 3).

The Examiner bears the initial burden of presenting a *prima facie* case of unpatentability, whether the rejection is based on prior art or any other ground. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). “The legal standard for definiteness [under § 112, second paragraph] is whether a claim reasonably appraises those of skill in the art of its scope.” *In re Warmerdam*, 33 F.3d 1354, 1361, 31 USPQ2d 1754, 1759 (Fed. Cir. 1994). The definiteness of the language employed in the claims must be analyzed, not in a vacuum, but always in light of the teachings of the prior art and the application disclosure as it would be interpreted by one of ordinary skill in the art. *See In re Angstadt*, 537 F.2d 498, 501, 190 USPQ 214, 217 (CCPA 1976).

We determine the written description of the specification is sufficient to inform one skilled in the art of the meaning of the claim language rejected by the Examiner.

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The specification clearly discloses the etching equipment is capable of processing an object within the post processing apparatus. The specification also discloses the functional relationship between the first and second gas supply means within the post processing apparatus. (Specification, page 5, line 14 to page 6, line 6). The Examiner has not presented any reasoning or evidence why the description of the intended processing of an object and the functional relationship between the first and second gas supply means renders the claim confusing and why one of ordinary skill in the art would not be apprised of the scope of a claim that contains this description. Therefore the examiner has not met the initial burden of presenting a *prima facie* case of unpatentability. Accordingly, the rejection of claims 26 and 27 under 35 U.S.C.

§ 112, second paragraph is reversed.

#### The prior art rejections

The initial inquiry into determining the propriety of the examiner's prior art rejections is to correctly construe the scope and meaning of the claimed subject matter. *Gechter v. Davidson*, 116 F.3d 1454, 1457, 43 USPQ2d 1030, 1032 (Fed. Cir. 1997); *In re Paulsen*, 30 F.3d 1475, 1479, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994). Generally, we give the broadest reasonable interpretation to the terms in claims consistent with Appellant's specification. *In re Morris*, 127 F.3d 1048, 1053-54, 44

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USPQ2d 1023, 1027 (Fed. Cir. 1997). When the terms in the claims are written in a “means-plus-function” format, however, we interpret them as the corresponding structure shown in the specification or equivalents thereof consistent with 35 U.S.C.

§ 112, paragraph 6. *In re Donaldson*, 16 F.3d 1189, 1193, 29 USPQ2d 1845, 1848 (Fed. Cir. 1994). The manner in which a “means-plus-function” element is expressed, either by a function followed by the term “means” or by the term “means for” followed by a function, is unimportant so long as the modifier of that term specifies a function to be performed.

*Ex parte Klumb*, 159 USPQ 694, 695 (Bd. App. 1967). According to *Al-Site Corp. v. VSI International Inc.*, 174 F.3d 1308, 1313, 50 USPQ2d 1161, 1166 (Fed. Cir. 1999),

if the word “means” appears in a claim element in combination with a function, it is presumed to be a means-plus-function element to which § 112, ¶ 6 applies .... Nevertheless according to its express terms, § 112, ¶ 6 governs only claim elements that do not recite sufficient structural limitations. *See also Unidynamics Corp. v. Automatic Products International Ltd.*, 157 F.3d 1311, 1319, 48 USPQ2d 1099, 1104-05 (Fed. Cir. 1998).

Claim construction is a question of law that we review *de novo*. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1456, 46 USPQ2d 1169, 1174 (Fed. Cir. 1998)(*in banc*).

Applying the above statutory interpretation to the present case, we determine that the terms “gas supply means” and “switching means” recited in claim 26 are

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mean-plus-function elements to which § 112, ¶ 6, applies. Claim 26 does not recite sufficient structural limitations for the above means. Thus, we look to the specification for the structure corresponding to “gas supply means” and “switching means” and equivalents thereof to determine the scope and meaning of claim 26, the broadest claim in this application.

We interpret the claimed “gas supply means” as the gas supply source for supplying a gas containing either O<sub>2</sub> for ashing or halogen containing gas for etching in to the processing vessel. The gas supply source is illustrated in Figure 3 and described at page 11, lines 1 to 6 of the specification, which is provided below for convenience:

A gas supply source 54 for supplying a gas containing O<sub>2</sub>, used for ashing into the processing vessel 41, and a gas supply source 55 for supplying a halogen-containing gas used for light etching into the processing vessel 41 are connected to the gas supply port 42 via a gas line 53.

We also interpret the claims “switching means” as the controller 61, valve 57, valve 58, and the mass flow controllers 59 and 60 as illustrated in Figure 3 and described at page 11, line 24 to page 12, line 2, of the specification, which is provided below for convenience:

The controller device 61, upon reception of the information, outputs control signals to the valves 57 and 58, and the mass flow controllers 59 and 60 so as to switch the components and the flow of gas supplied into the processing vessel 42 from the ashing use to the light etching use.

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We note Appellant asserts that the switching means includes valve 56. (Brief, page 6, lines 1-2, page 10, lines 9-11 and Reply Brief, paragraph bridging pages 2 and 3). Upon review of figure 3 and the above cited portions of the specification, we do not agree with Appellant because the function of the gas the switching means is to allow rapid switching between specific ashing and etching gases. Valve 56 appears to function as a gas shut off.

The rejections under 35 U.S.C. § 102

To establish an anticipation under Section 102, a reference must disclose, either expressly or under the principles of inherency, each and every element of the claimed invention. *See In re Spada*, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990); *RCA Corp. v. Applied Digital Data Systems, Inc.*, 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984).

The Examiner has rejected claim 26 under 35 U.S.C. § 102(e) as anticipated by the disclosure of Amemiya. The Examiner asserts Amemiya's mass flow controllers are a switching means. (Examiner's Answer, page 4, line 2). Also, "mass flow controllers are controllable valves, as is well known by those in the art. Hence the mass flow controllers of Amemiya et al are at least equivalent if not identical to those of the instant disclosure." (Examiner's Answer, page 7, first paragraph) (emphasis original).

Appellant asserts the Examiner has not established that Amemiya discloses the claimed switching means which includes valves. (Brief, pages 8-10 and Reply Brief, pages

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1-3). Appellant asserts the “valves are used to quickly switch between specific ashing and etching gases, where the flow rates of the specific gases are regulated by the mass flow controllers under control of the controller 61, so that a high throughput and high etching producibility may be achieved by prompt switching from an ashing gas to an etching gas when an ashing process has been detected as being substantially completed.” (Reply Brief, page 3, lines 1-8).

Amemiya teaches an apparatus for etching objects which includes a post processing apparatus. The post processing apparatus contains a controller, mass flow controllers and a gas supply source for etching and a gas supply source for ashing an object. (Note Figure 2). The flow of the gases are regulated by the use of mass flow controllers. The etching and ashing processes are disclosed to occur at the same time, not sequentially. (See, column 2 line 63 to column 3, line 6). Amemiya does not describe the specific structural arrangement, i.e. valves and mass flow controllers under control of a controller, embodied by the claimed means for quickly switching between the first and second gas supply. Accordingly, we cannot sustain the rejection of claim 26 under 35 U.S.C. § 102(e) over Amemiya.

The Examiner has rejected claim 26 under 35 U.S.C. § 102(e) as anticipated by the disclosure of Maher.

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Maher teaches multiple plasma etching vessels, each configured to perform separate processing step on a wafer. (Column 1, lines 50 to 59). No one chamber is disclosed to perform both ashing followed by light etching on a wafer within that chamber. Maher does not disclose the sequential use of an etching gas supply source and ashing gas supply source. Maher also does not describe a switching mechanism, for switching between various gas supply sources, which is embodied by the claimed means for quickly switching between the first and second gas supply. Accordingly, we cannot sustain the rejection of claim 26 under 35 U.S.C. § 102(e) over Maher.

The rejections under 35 U.S.C. § 103

It is well established that the examiner has the initial burden under § 103 to establish a *prima facie* case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984). To that end, the examiner must show that some

objective teaching or suggestion in the applied prior art, or knowledge generally available in the art would have led one of ordinary skill in the art to arrive at the claimed invention. *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1630 (Fed. Cir. 1996).

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Claim 27 has been rejected as unpatentable under 35 U.S.C. § 103 over Amemiya in view of Savage.

The Examiner adds Savage to Amemiya, applied above, to reject the subject matter of claim 27. The Examiner states “[i]t would have been obvious to one of ordinary skill in the art at to have incorporated a plasma etch endpoint detection system such as that of Savage in the plasma apparatus of Amemiya for the advantages of automatic control of the etch[ing] process parameters such as the gas flow as taught by Savage.” (Examiner’s Answer, page 5, first paragraph). Claim 27 is a dependent claim which include the limitations of claim 26. The inclusion of an endpoint detection system would not have led to the claimed invention because the substitution of the endpoint detection system does not address the deficiencies of Amemiya stated above.

Claim 27 has been rejected as unpatentable under 35 U.S.C. § 103 over Maher in view of Savage or Otsubo.

The Examiner adds Savage and/or Otsubo to Maher, applied above, to reject the subject matter of claim 27. The Examiner asserts it would have been obvious to one of ordinary skill in the art at to have incorporated a plasma endpoint detection system such as that of Savage or Otsubo in the system of Maher. (Examiner’s Answer, page 5, line 8 to page 6 line 7). The inclusion of an endpoint detection system would not have led to the

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claimed invention because the substitution of the endpoint detection system does not address the deficiencies of Maher stated above.

In the absence of sufficient factual evidence or scientific rationale to establish why and how a skilled artisan would have arrived at the subject matter of claim 27 from the applied references, we find that the initial burden of establishing the *prima facie* obviousness of the claimed subject matter has not been met. The 35 U.S.C. § 103 rejections of claim 27 are reversed.

### ***CONCLUSION***

The rejection of claims 26 and 27 as unpatentable under 35 U.S.C. § 112, second paragraph is reversed.

The rejection of claim 26 as unpatentable under 35 U.S.C. § 102(e) as anticipated by Amemiya is reversed.

The rejection of claim 26 as unpatentable under 35 U.S.C. § 102(e) as anticipated by Maher is reversed.

The rejection of claim 27 as unpatentable under 35 U.S.C. § 103 over Amemiya in view of Savage is reversed.

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The rejection of claim 27 as unpatentable under 35 U.S.C. § 103 over Maher in view of Savage or Otsubo is reversed.

**REVERSED**

TERRY J. OWENS )  
Administrative Patent Judge )  
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) BOARD OF PATENT  
JEFFREY T. SMITH ) APPEALS AND  
Administrative Patent Judge ) INTERFERENCES  
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)  
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Administrative Patent Judge )

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MAIER & NEUSTADT  
1755 JEFFERSON DAVIS HIGHWAY  
FOURTH FLOOR  
ARLINGTON, VA 22202

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## **APPENDIX**

26. Etching equipment comprising:

an etching apparatus for main etching an object having a resist film as an etching mask with a plasma produced by an etching gas;

a post-processing apparatus for removing a resist film remaining on the object after the main etching step, a polymer deposited on the surface of the object, and a

damage layer formed by the main etching treatment; and transfer means for transferring the object from the etching apparatus to the post-processing apparatus, wherein:

the post-processing apparatus includes a processing chamber, first gas supply means for supplying an O<sub>2</sub> gas or a mixture of an O<sub>2</sub> gas and an inert gas into the processing chamber, second gas supply means for supplying a halogen-containing gas or a mixture of a halogen-containing gas and an inert gas into the processing chamber, and switching means for switching a gas supply by the first gas supply means to a gas supply by the second gas supply means;

the object, after the main etching treatment, is treated with a plasma treatment produced by the gas supply by the first gas supply means and consisting essentially of an O<sub>2</sub> gas or a mixture of an O<sub>2</sub> and an inert gas so as to remove a resist film remaining on the object and a polymer deposited on the surface of the object; and

after substantially completing the plasma treatment, the gas supply through the first and second gas supply means is switched by the switching means to perform a plasma treatment with a plasma produced by a gas mixture consisting essentially of a halogen-containing gas and an O<sub>2</sub> gas or a halogen containing gas, an O<sub>2</sub> gas, and an inert gas so as to remove an impurity layer formed by the main etching.

27. The equipment according to claim 26, wherein said switching means includes an end point detection device for detecting completion of the plasma process by means of plasma produced from the gas including O<sub>2</sub> gas in said post-processing apparatus, and performs switching of gas in accordance with an instruction from said end point detection device.