

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MITSUAKI MINATO,
AKIRA UEHARA and
ATSUSHI MATSUSHITA

Appeal No. 96-0377
Application 07/979,254¹

HEARD: AUGUST 3, 1999

Before KRASS, FLEMING, and HECKER, **Administrative Patent Judges.**

HECKER, **Administrative Patent Judge.**

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1, 2, 5 through 10 and 13 through 20. Claims 4

¹ Application for patent filed November 20, 1992.

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and 12 have been canceled. Claims 3 and 11 have been indicated as allowable.

The invention relates to a coaxial plasma processing apparatus for etching a wafer surface without damaging charge buildup, in the reaction region. In particular, referring to Figure 1, chamber 3 is evacuated, a reaction gas is introduced into the chamber 3, and electric energy is applied to outer electrode 5. A plasma is generated in the annular space that is defined between the chamber 3 and the inner electrode 10. Charged particles in the plasma are prevented from passing through the inlet holes 11 in the inner electrode 10 so that only neutral particles pass through the holes 11 into the reaction region for thereby etching surfaces of the wafers W. Insulating plate 2 prevents an electric discharge from being developed between the outer electrode 5 and the base plate 1. As a consequence no charge buildup is developed in the reaction region.

Representative independent claim 1 is reproduced as follows:

1. A coaxial plasma processing apparatus comprising:

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a metallic base plate having an opening defined therein, said metallic base plate being grounded;

a reaction chamber disposed on said metallic base plate;

a cylindrical outer electrode disposed around said reaction chamber;

a high-frequency power supply connected to said cylindrical outer electrode;

a cylindrical inner electrode disposed in said reaction chamber coaxially with said cylindrical outer electrode, said cylindrical inner electrode having a plurality of inlet holes defined therein, said cylindrical inner electrode having a lower end disposed in said opening and fixed to said metallic base plate; and

an insulating plate covering an upper surface of said metallic base plate.

The Examiner relies on the following references:

Steinberg et al. (Steinberg)	4,367,114	Jan. 4, 1983
Bersin et al. (Bersin)	5,099,100	Mar. 24, 1992 (filed Sept. 29, 1989)
Iwashiro ² (Japanese Kokai)	H1-095730	June 26, 1989

² The Examiner and Appellants refer to this reference as Ramco.

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Claims 1, 2, 5, 7 through 10, 13 and 15 through 20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Iwashiro in view of Steinberg.

Claims 6 and 14 stand rejected under 35 U.S.C. § 103 as being unpatentable over Iwashiro and Steinberg, further in view of Bersin.

Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the brief, reply brief and answer for the respective details thereof.

OPINION

We will not sustain the rejection of claims 1, 2, 5 through 10 and 13 through 20 under 35 U.S.C. § 103.

ANALOGOUS ART

Appellants argue that the Steinberg disclosure of a high speed plasma etching system is not analogous art. Appellants maintain that Steinberg pertains to a **non-coaxial** plasma processing apparatus for processing work pieces one at a time, while Appellants' apparatus pertains to a **coaxial** plasma

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processing apparatus for simultaneously processing a plurality of work pieces at a time.

In determining whether a claim would have been obvious at the time of the invention, the Examiner must first determine the scope and content of the prior art. **Graham v.**

John Deere

Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). "Although § 103 does not, by its terms, define the 'art to which [the] subject matter [sought to be patented] pertains,' this determination is frequently couched in terms of whether the art is analogous or not, *i.e.*, whether the art is 'too remote to be treated as prior art.'" **In re Clay**, 966 F.2d 656, 658, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992) **citing In re Sovish**, 769 F.2d 738, 741, 226 USPQ 771, 773 (Fed. Cir. 1985).

In making this determination, we must consider two criteria. First, it must be determined if the prior art is from the same field of endeavor, regardless of the problem addressed. Secondly, even if the prior art is not in the same field of endeavor, it must be determined whether the reference

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still is reasonably pertinent to the particular problem with which the inventor is involved. *In re Clay, supra*. With respect to the field of endeavor, we agree with the Examiner. Since Steinberg and Appellants' invention are classified in the very same class and subclass in the Patent Office Manual of Classification, i.e., Class 156 subclass 345, Differential Etching Apparatus, there is little dispute that they are in the same field of endeavor. We need go no further to answer the second question of the particular problem which is involved.

Combinability

Appellants argue on pages 8 and 9 of the brief:

In this regard, the unobvious-ness under 35 USC § 103 of the invention defined in claims 1 and 9 over the applied references is strongly reflected by the fact that none of the references address or in any way appreciate the particular charge buildup problem of coaxial plasma processing apparatus which is addressed and advantageously overcome by the invention of the independent claims.

And in their reply brief at page 2:

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Further, the [Iwashiro] reference[] does not discuss any problem of short-circuit discharge, so that it is not established that any "common problem" exists.

Looking at Appellants' invention, we note that inner electrode 10 and table 8 are grounded with base plate 1. Outer electrode 5 is insulated from grounded base plate 1 by the tubular reaction chamber 3, made of synthetic quartz. One would suspect that further insulation, by way of plate 2, would not be needed. Without recognition of the problem, one would not seek a solution.

The Examiner has failed to set forth a **prima facie** case. It is the burden of the Examiner to establish why one having ordinary skill in the art would have been led to the claimed invention by the reasonable teachings or suggestions found in the prior art, or by a reasonable inference to the artisan contained in such teachings or suggestions. **In re Sernaker**, 702 F.2d 989, 995, 217 USPQ 1, 6 (Fed. Cir. 1983). The Examiner has shown no reason to believe a discharge problem existed with a coaxial plasma etching apparatus. Appellants have found the problem and solved it.

Steinberg recognizes a problem of charge discharge, but it is a different problem. Steinberg's chamber **retains**

charged particles at the wafer and provides insulation ring 24 to avoid "a short-circuit discharge current [will occur] around the wafer [which would] greatly reduce the etching rate." (column 3, lines 36 and 37). On the other hand, Appellants chamber **retains neutral particles** at the wafer, and has no problem with short circuit discharge around the wafer. Therefore, one would not conclude that Iwashiro (a coaxial plasma apparatus) would have the Steinberg charge-discharge problem and a need for further base plate insulation.

Since Iwashiro provides no teaching or suggestion for base plate insulation, and Steinberg provides no teaching or suggestion to provide insulation in a coaxial plasma apparatus, we find the Examiner has provided no motivation to combine these references. Thus, we will not sustain the rejection of independent claims 1 and 9, and likewise the rejection of dependent claims 2, 5 through 8, 10 and 13 through 20. We note however, with respect to dependent claims 6 and 14, the Examiner is correct. The claimed hole diameter and pitch would

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be an optimization of Bersin, determined through "routine experimentation." Appellants have indicated no criticality of the claimed dimensions. They have merely stated what was used in their invention without explanation. Bersin's hole diameter and pitch are of the same order of magnitude as claimed by Appellants, and are considered to be applicable to optimization. We have not sustained the rejection of claims 1, 2, 5 through 10 and 13 through 20 under 35 U.S.C. § 103. Accordingly, the Examiner's decision is reversed.

REVERSED

ERROL A. KRASS)	
Administrative Patent Judge)	
)	
)	
MICHAEL R. FLEMING)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
)	
STUART N. HECKER)	
Administrative Patent Judge)	

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Carrier, Blackman & Associates, P.C.
24101 Novi Road
Suite 100
Novi, MI 48375

SNH/cam