

The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.

Paper No. 35

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MELISA J. BUIE,
LEONID POSLAVSKY
and JENNIFER LEWIS

Appeal No. 2002-0453
Application No.08/686,229

ON BRIEF

Before WARREN, OWENS and WALTZ, *Administrative Patent Judges*.
OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal is from the final rejection of claims 1, 3-8, 17 and 18. Claims 5, 17 and 18 were canceled after final rejection. Hence, the claims before us are claims 1, 3, 4 and 6-8.

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Takeshi Shiga et al. (Shiga), "An On-Line Differential Converter, for Obtaining the First Derivative of Absorption Spectra", 44 *Anal. Biochem.* 291-97 (1971).

Abdel-Aziz M. Wahbi et al. (Wahbi), "Ratios of First-derivative Maxima and Compensated Derivative Absorption Curves", 111 *Analyst* 777-80 (1986).

THE REJECTION

Claims 1, 3, 4 and 6-8 stand rejected under 35 U.S.C. § 103 as being unpatentable over Schoenborn in view of Sherwood, Shiga and Wahbi.

OPINION

We reverse the aforementioned rejection. We need to address only the sole independent claim, i.e., claim 1.

The appellants' claim 1 claims a method for measuring uniformity of a surface of a wafer as a result of an etching process, and requires that a uniformity value representing the uniformity of the surface of the wafer is generated.

Schoenborn discloses a "method for determining the uniformity of etch rate during plasma processing of production or test wafers in single wafer etchers" (col. 13, lines 9-12), and teaches (col. 3, lines 22-32):

According to the invention, plasma emission intensity is monitored during etching, at a particular wavelength, and is correlated to remaining thickness of a film being etched. In this manner, it can be determined when one or more known film thicknesses remain over a substrate.

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According to a feature of the invention, by knowing when certain remaining film thicknesses occur, the overall etching process can be calibrated on-the-fly. In this manner, by knowing etch rate and remaining thickness, etch endpoint can be closely predicted, and overetch can be more carefully controlled.^[1]

Schoenborn's procedure includes calculating the etch rate uniformity, u , based upon variables including the initial film uniformity, U_n (col. 4, lines 44-45; col. 12, lines 6-7).

Schoenborn teaches that if the initial film is very uniform, the film uniformity does not need to be measured (col. 11, lines 1-4).

Schoenborn exemplifies the etch rate uniformity as $<\pm 3.8\%$ (col. 12, line 7). The examiner argues that "[i]f this measurement 'u' is etch rate uniformity as interpreted by Appellants which is the rate of disappearance of film on top of the waver [sic, wafer], then, there could be only one direction, the % of decreasing thickness of the film. On the contrary, if this measurement is the uniformity of thickness across the surface of the wafer, i.e. the variation from a mean thickness,

¹ Stated in different terms, "endpoint traces can reveal interference effects caused by plasma emission being absorbed by the etched film. An absorption minima corresponds to a known remaining thickness, and could therefore be used for endpoint before uncovering the underlying material (before 'clearing'). This would enable a switchover to a more selective or less damaging process at a known thickness before clearing" (col. 6, lines 46-53).

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then there would be '+values' as well as '-values' i.e. deviations, just as the recitation of Schoenborn stated" (answer, page 5). The examiner is incorrect because, as explained by the appellants (reply brief, page 4), the etch rate of an etching process having a particular etch rate and an etch rate uniformity of $\pm 3.8\%$ would vary between a positive deviation 3.8% above the etch rate and a negative deviation 3.8% below the etch rate.

The examiner points out that Schoenborn's claim 12 recites "determining a uniformity 'u' of the film subsequent to etching", and argues that "the 'uniformity of film subsequent to etching' of Schoenborn '356 is **identical** to the uniformity of a wafer as a result of an etching process as the instant claims" (answer, page 6). The symbol for uniformity in claim 12, i.e., "u", is defined as "uniformity of etch rate E" (col. 4, line 44). Moreover, the formula in claim 12 for calculating u is the same as that for calculating etch rate uniformity (col. 12, lines 6-7). Thus, it is clear that the uniformity recited in claim 12 is the etch rate uniformity, not the film thickness uniformity. An additional indication that the uniformity in Schoenborn's claim 12 is etch rate uniformity is the declaration of Sarfaty (filed February 29, 2000, paper no. 21) wherein Sarfaty states that "[t]here is no discussion in the patent [Schoenborn] that explicitly describes how a film uniformity would be derived from

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etch-rate uniformity such that claim 12 would be supported by the text of the patent" (page 2). The examiner does not address this statement.

The references other than Schoenborn are relied upon by the examiner for a suggestion to use the first derivative of Schoenborn's data, and not for any teaching that remedies the above-discussed deficiency in Schoenborn.

For the above reasons we conclude that the examiner has not carried the burden of establishing a *prima facie* case of obviousness of the appellants' claimed invention.

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DECISION

The rejection of claims 1, 3, 4 and 6-8 under 35 U.S.C. § 103 over Schoenborn in view of Sherwood, Shiga and Wahbi is reversed.

REVERSED

CHARLES F. WARREN)	
Administrative Patent Judge)	
)	
)	
)	
)	BOARD OF PATENT
TERRY J. OWENS)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
)	
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THOMAS A. WALTZ)	
Administrative Patent Judge)	

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