Paper No. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RICHARD L. GULDI and JEFFREY W. RITCHISON

Appeal No. 1997-3360
Application No. 08/119,785

ON BRIEF

Before McKELVEY, Senior Administrative Patent Judge, and PAK and DELMENDO, Administrative Patent Judges.

DELMENDO, Administrative Patent Judge.

DECISION ON APPEAL UNDER 35 U.S.C. § 134

Upon consideration of the record, it is:

ORDERED that the examiner's final rejection of claims

1 through 4 and 7[1] as unpatentable under 35 U.S.C. § 103 over:

[1] Claim 19, which was also finally rejected, has been canceled (Paper 20, "Amendment Pursuant to 37 CFR 1.116"; Paper 22, advisory action, item 3).

(1) Basi, U.S. Patent 4,129,457 (1978) (Basi ‘457),

(2) Basi, U.S. Patent 4,050,954 (1977) (Basi ‘954),

and

(3) Cleveland, U.S. Patent 2,961,354 (1960),

is reversed.

Initially, we note that appealed claim 1, the sole independent claim, recites the step of "(a) providing a wafer to be cleaned, said wafer with exposed metal regions" (emphasis added). However, neither the examiner nor the appellants have explored whether Basi '457 or Basi '954 describes this claim element and, if not, whether one of ordinary skill in the art would have found it obvious to apply the method described in either of these two prior art references to a "wafer with exposed metal regions." Even assuming that Basi '457 or Basi '954 describes this claim element, for the reasons which follow, we reverse.

Appealed claim 1 also recites the step of "(b) applying a solution consisting essentially of water and ammonium hydroxide to said wafer while simultaneously applying an ultrasonic energy to said solution" (emphasis added). The examiner has determined that Basi '457 and Basi '954 do not describe "simultaneous application of ultrasonic energy to a solution consisting essentially of water plus ammonium

hydroxide" (Paper 23, examiner's answer, page 4).

Nevertheless, the examiner has taken the following position:

> Absent a showing of new or unobvious results, it would have been obvious to clean wafers by incorporating the step of washing the wafer in a warm ultrasonically agitated aqueous detergent solution of Cleveland to the dilute ammonium hydroxide cleaning solution of Basi '954 or Basi '457 because not only will this stabilize the properties of the semiconductor wafers as taught by Cleveland, but also because each step is known individually to improve the cleaning of wafers and the person of ordinary skill in the art would expect such combination to improve wafer cleaning in an additive or cumulative manner. [Examiner's answer, p. 5.]

We disagree.

Both Basi '954 and Basi '457 teach the use of dilute NH_4OH to remove heavy metal ion contamination that may be present on the polished surface of a semiconductor material following an oxidizing operation (column 2, lines 43-54 of Basi '954; column 2, lines 47-55 of Basi '457). According to these prior art references, the oxidizing operation removes metal oxide (e.g., silica) slurry particles, which are embedded in the surface of the semiconductor during the polishing operation and which evidently form siloxane-type bonds on the surface of the semiconductor to render the surface to be hydrophobic

(column 1, line 45 to column 2, line 42 of Basi ‘954; column 1, line 47 to column 2, line 46 of Basi ‘457).

Cleveland teaches that the wafer is washed in a warm ultrasonically agitated aqueous detergent solution to remove substantially all physical contaminants, such as dust and other discrete particles, which are not attached to the surface by direct chemical bonds (column 1, lines 49-54). According to Cleveland, this washing step “facilitates the subsequent removal of chemically bound contaminants” (emphasis added; column 1, lines 54-56). Cleveland further teaches that the removal of chemically bound contaminants involves an oxidizing step which is “particularly efficacious for removing chemisorbed hydrophobic contaminants” (emphasis added; column 1, lines 57-70).

Given these teachings in the prior art, one of ordinary skill in the art might have arrived at a method in which the wafer is washed with ultrasonically agitated aqueous detergent solution, as shown in Cleveland, before the oxidizing and dilute NH_4OH rinsing steps described in Basi ‘954 or Basi ‘457. Such a method, however, is not the invention recited in the appealed claims. Rather than suggesting the present

invention, the combination of Basi '954 or Basi '457 with Cleveland teaches away from it. W.L. Gore & Assoc. v. Garlock, Inc ., 721 F.2d 1540, 1550, 220 USPQ 303, 311 (Fed. Cir. 1983, cert. denied, 469 U.S. 851 (1984) (holding that it is error to find obviousness where the prior art references "diverge from and teach away from the invention at hand").

Absent some teaching, suggestion, or incentive to combine the prior art references to arrive at a method including a step of washing a wafer with a solution consisting essentially of water and NH_4OH while simultaneously applying ultrasonic energy to the solution, the examiner's obviousness rejection cannot stand. C.R. Bard, Inc. v. M3 Sys. Inc., 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232 (Fed. Cir. 1998). We therefore hold that the examiner has not carried the initial burden of establishing a prima facie of obviousness within the meaning of 35 U.S.C. § 103. In re Piasecki, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984).

The decision of the examiner is reversed.

REVERSED

FRED E. McKELVEY Senior Administrative Patent Judge	)
CHUNG K. PAK Administrative Patent Judge	) BOARD OF PATENT) APPEALS) AND) INTERFERENCES
ROMULO H. DELMENDO Administrative Patent Judge	)

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