Paper No. 11

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte YING-HO CHEN, WEN-CHIH CHIOU,
CHENG-CHUNG LIN, and SYUN-MING JANG

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Appeal No. 2004-0085
Application No. 09/876,447

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ON BRIEF

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Before GARRIS, PAK, and DELMENDO, Administrative Patent Judges.

GARRIS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the final rejection of claims 1 and 3-18 which are all of the claims in the application.

The subject matter on appeal relates to a method and apparatus for in-situ cleaning of a pad and a wafer during chemical mechanical polishing wherein an acid-containing solution comprising water and an acid selected from the group consisting of citric acid, HCOOH, CH_3COOH, HNO_3, H_2SO_4, and HF is dispensed

onto the top surface of the polishing pad while the pad and wafer are being rotated. This appealed subject matter is adequately illustrated by independent claim 1 which reads as follows:

1. A method for in-situ cleaning a pad and a wafer during chemical mechanical polishing comprising the steps of:

rotating a wafer and a polishing pad in opposite directions;

conducting a chemical mechanical polishing process on a wafer surface;

stopping the dispensing of a slurry solution onto a top surface of said polishing pad;

mixing an acid-containing solution from water and an acid selected from the group consisting of citric acid, HCOOH, CH_3COOH, HNO_3, H_2SO_4 and HF;

dispensing said acid-containing solution onto said top surface of said polishing pad while said wafer and said pad are being rotated.

The references relied on by the examiner are:

Koos et al. (Koos)	5,934,980	Aug. 10, 1999
Laursen et al. (Laursen)	6,387,188 B1	May 14, 2002 (filed Mar. 3, 1999)

Claims 1, 3-7 and 9-18 are rejected under 35 U.S.C. §102(b) as being anticipated by Koos.

Claim 8 is rejected under 35 U.S.C. §103(a) as being unpatentable over Koos in view of Laursen.

We refer to the Brief and to the Answer and final Office action (Paper No. 4) for a complete exposition of the opposing viewpoints expressed by the appellants and by the examiner concerning the above noted rejections.

The appellants have separately grouped and argued the appealed claims in accordance with the manner in which they have been rejected (see page 5 of the Brief).

OPINION

For the reasons set forth below, we will sustain each of these rejections.

As explained by the examiner in the Answer, the Koos reference discloses both a method and an apparatus for in-situ cleaning of a pad and wafer during chemical mechanical polishing wherein an acid-containing solution is dispensed onto the top surface of the polishing pad (see Answer, page 3-4). The examiner describes in detail how the Koos reference discloses every element of claims 1, 3-7 and 9-18, including the steps of "mixing an acid-containing solution from water and an acid selected from the group consisting of HF (hydrofluoric acid)" and "dispensing the acid-containing solution onto the top surface of the polishing pad 16 while the wafer 12 and the pad 16 are being rotated" (see Answer, page 3).

The appellants respond on page 8 of the Brief that the solution disclosed in Koos and relied upon by the examiner in the final rejection "**contains both a weak acid and a weak base** and, wherein the only example of a weak acid is shown as containing 20 parts of ammonium fluoride **and** 1 part hydrofluoric acid, which is

clearly not a water solution of HF" (emphasis in original). The appellants also contend after describing the invention of Koos that "[t]he present invention, to the contrary, teaches and claims a method for in-situ **cleaning** a pad and a wafer" (Breif, page7; emphasis in original)[1].

In response to these arguments, the examiner replies that the Koos reference "clearly disclose[s] a water solution of HF" and further quotes the reference as teaching a solution comprising "about 20 parts by volume of ammonium fluoride solution (80 weight percent in water) and 1 part hydrofluoric acid (49 weight percent in water)" (see Answer, page 5).

We agree with the examiner that the Koos reference discloses a water solution of HF. The Koos reference, at column 6, lines 63-67, discloses a buffer solution wherein the hydrofluoric acid is 49 weight percent in water. Thus, 51 percent of the total weight of the 1 part hydrofluoric acid is attributable to water and 49 percent of the total weight of the 1 part hydrofluoric acid is attributable to the hydrofluoric acid.

[1] It should be noted that appellants make no specific arguments directed at the rejection of the apparatus claims, but rather focus on differentiating the method claims from the prior art. None of the arguments presented by the appellants in the Brief are persuasive or even relevant in overcoming the examiner's §102(b) rejection with respect to the apparatus claims. Significantly, the appellants do not identify and we do not find structural elements present in the independent apparatus claim which differentiate the claimed invention from the apparatus disclosed in Koos.

The solution disclosed by Koos qualifies as a water solution of HF.

We further note that independent claims 1 and 11 (as well as all of the dependent claims) are considered "open" claims because they include the term "comprising" in the preamble. Therefore, interpretation of all of the claims under appeal is not limited to only those elements specifically recited. The term "comprises" permits the inclusion of other (i.e., unrecited) steps, elements, or materials. In re Baxter, 656 F.2d 679, 686, 210 USPQ 795, 802. Thus, the fact that the solution disclosed in Koos includes a weak acid and a weak base does not preclude the reference from reading on the claim recitation of an "acid-containing solution from water and an acid selected from the group consisting of citric acid, HCOOH, CH_3COOH, HNO_3, H_2SO_4, and HF" (i.e., because the claims are "open" claims).

Finally, with respect to appellants' argument that Koos does not teach a method of cleaning a pad and a wafer, we point to the abstract as well as Figure 3 of the Koos reference for support that Koos teaches a method of cleaning a pad and a wafer. The abstract states in part that "[a] diluting solution is then applied to the polishing pad to remove slurry of the first CMP step." Removal of slurry constitutes cleaning of a pad and a wafer. Further, element 44 of Figure 3 contains the caption

"CLEAN THE POLISHING SURFACE OF THE POLISHING PAD." It follows that Figure 3 also provides evidence that Koos discloses a method of cleaning a pad and a wafer.

With respect to the §103(a) rejection of dependent claim 8, the examiner cites Laursen to support an obviousness conclusion with respect to using citric acid in formulating Koos' acid-containing solution. Appellants broadly respond that Laursen "does not lend any additional weight in a §103(a) rejection of the present in-situ cleaning method" and maintain that they have "clearly shown above that the primary reference of Koos et al does not teach a method for in-situ cleaning of a pad and a wafer during CMP, including the step of mixing an acid-containing solution from water and an acid selected from the group consisting of citric acid, HCOOH, CH_3COOH, HNO_3, H_2SO_4 and HF" (Brief, page 9). The examiner replies on pages 5 through 6 of the Answer that Laursen discloses the use of citric acid in an acid-containing solution and that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to use citric acid as disclosed by Laursen et al in place of hydrofluoric acid (HF) with the method and apparatus of Koos et al in order to remove copper-containing debris from a surface of a polishing pad."

We agree with the examiner's conclusion of obviousness for the reasons expressed in the Answer. The appellants have given no basis for a contrary conclusion other than their argument that the primary reference is deficient and that Laursen lends no additional weight in the §103(a) rejection. As we have already found the Koos primary reference is not deficient with respect to the §102(b) rejection, we cannot agree with the appellants. We therefore sustain the §103(a) rejection of claim 8 as being unpatentable over Koos in view of Laursen.

SUMMARY

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

Bradley R. Garris Administrative Patent Judge	)	
Chung K. Pak Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
Romulo H. Delmendo Administrative Patent Judge	)	

BRG:tdl

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