

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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. 32

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte GAUTAM S. GROVER and BRIAN L. MUELLER

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Appeal No. 2002-1757  
Application No. 08/994,894

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ON BRIEF

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Before GARRIS, DELMENDO, and JEFFREY T. SMITH, Administrative Patent Judges.

GARRIS, Administrative Patent Judge.

DECISION ON APPEAL

Appeal No. 2002-1757  
Application No. 09/994,894

This is a decision on an appeal which involves claims 1, 2, 4-29 and 38.<sup>1</sup> These are all of the claims remaining in the application.

The subject matter on appeal relates to an aqueous chemical mechanical polishing composition comprising soluble cerium including  $Ce^{3+}$  ions and/or  $Ce^{4+}$  ions in combination with an oxidizing agent having an oxidation potential greater than  $Ce^{4+}$ . Further details of this appealed subject matter are set forth in representative independent claims 1 and 38 which read as follows:

1. An aqueous chemical mechanical polishing composition comprising:

the reaction product of from about 0.05 to about 10.0 wt% soluble cerium including  $Ce^{3+}$  ions; and

an oxidizing agent having a [sic, an] oxidation potential greater than  $Ce^{4+}$ .

38. An aqueous chemical mechanical polishing composition comprising:

soluble cerium include  $Ce^{4+}$  ions;

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<sup>1</sup> Contrary to the representation of the claim 2 copy which appears in the appendix of the appellants' brief, this claim depends from canceled claim 30 rather than pending claim 38. For purposes of resolving the issues before us on this appeal, we will assume that claim 2 depends from claim 38. Nevertheless, the aforementioned claim 2 informality should be corrected by the appellants upon return of this application to the jurisdiction of the Examining Corps. We further note that, contrary to the representation of the claim copies of the brief appendix, dependent claim 3 is canceled rather than pending and claim 9 depends from claim 8.

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an oxidizing agent having a [sic, an] oxidation potential greater than  $Ce^{4+}$ ; and

at least one nitrate salt.

The references relied upon by the examiner as evidence of obviousness are:

Farkas et al. (Farkas)	5,773,364	Jun. 30, 1998 (filed Oct. 21, 1996)
Kaufman et al. (Kaufman)	5,783,489	Jul. 21, 1998 (filed Sep. 24, 1996)

All of the appealed claims are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kaufman and Farkas. In the paragraph bridging the third and fourth pages of the answer, the examiner's position is expressed as follows:

Kaufman teaches a CMP slurry whose abrasive includes zirconia, silica, ceria, alumina and mixture thereof. The metal oxide abrasive is formed into a colloidal dispersion. [T]he colloidal cerium would naturally include of [sic] dissolved  $Ce^{3+}$  (as also described in page 9, line 18 of specification). His slurry also includes ammonium persulfate of 4 w% in examples 1-3, which would be an oxidizing agent having an oxidation potential greater than  $Ce^{4+}$  (col. 3, line 20; col. 5, line[s] 55-68; claim 7). Unlike claimed invention, Kaufman doesn't describe the slurry having 0.05-10wt% of soluble cerium. Farkas describes a slurry composition having one or more oxidizing/etching species such as ammonium nitrate, ammonium cerium nitrate, and ammonium cerium sulfate. The ammonium cerium sulfate and ammonium cerium nitrate (nitrate salt) would produce soluble cerium including  $Ce^{3+}$ ,  $Ce^{4+}$  (col. 3, line[s] 19-25; col. 4, line 3). It would have been obvious at the time of the invention for one skill in the art to modify Kaufman's slurry in light of Farkas because Farkas teaches that one or more

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oxidizing/etching species can be used and these oxidizers are better than oxidation compound hydrogen peroxide, which is used by Kaufman, and is environmental safe and can be easily disposed of after use (col. 2, line[s] 9-16, line[s] 34-54).

We refer to the brief and reply brief and to the answer for a complete exposition of the opposing viewpoints expressed by the appellants and by the examiner concerning the above noted rejection.

#### OPINION

This rejection cannot be sustained.

As indicated in the above quoted statement from the answer, it is examiner's finding that Kaufman's "colloidal cerium would naturally includes of [sic] dissolved  $Ce^{3+}$  (as also described in page 9, line 18 of specification)" (answer, third page). This finding is clearly erroneous. Although Kaufman discloses a chemical mechanical polishing slurry which comprises a colloidal dispersion that may contain cerium oxide, we agree with the appellants' argument (see pages 5 and 6 of the brief) which is supported by evidence (see appendix C of the brief) that cerium oxide is insoluble and accordingly that patentee's slurry would not "naturally" include "dissolved  $Ce^{3+}$ " as urged by the examiner.

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We also agree with the appellants' argument (see page 9 of the brief) that the examiner has combined the Kaufman and Farkas references in a manner which is inconsistent with how one of ordinary skill in the art would interpret the teachings of each reference. For example, the examiner concludes that it would have been obvious to provide the chemical mechanical polishing slurry of Kaufman with the ammonium cerium sulfate and/or ammonium cerium nitrate taught by Farkas "because Farkas teaches that one or more oxidizing/etching species can be used and these oxidizers [i.e., the aforementioned ammonium cerium sulfate and ammonium cerium nitrate] are better than oxidation compound hydrogen peroxide, which is used by Kaufman" (see the fourth page of the answer). This obviousness conclusion is simply not supported by the applied reference teachings.

Kaufman's slurry is specifically formulated to exhibit high polishing selectivities toward titanium, titanium nitride, and aluminum (e.g., see the abstract and lines 1-4 in column 3). Toward this end, patentee uses a peroxy compound such as hydrogen peroxide as the first of at least two oxidizers because such peroxy compound oxidizers exhibit good polishing selectivity for titanium (e.g., see lines 18-32 in column 4). In this regard, Farkas contains no teaching or suggestion that his ammonium

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cerium sulfate and ammonium cerium nitrate oxidizers would exhibit Kaufman's desired polishing selectivity towards titanium. Indeed, the to-be-polished surfaces disclosed by Farkas (e.g., see lines 7-9 and 36-48 in column 3) do not even contain titanium.

Thus, while the oxidizers of Farkas may contain certain advantages over hydrogen peroxide, an artisan with ordinary skill would have had no reasonable expectation that Kaufman's hydrogen peroxide could be successfully replaced with Farkas' ammonium cerium sulfate and/or ammonium cerium nitrate vis-à-vis achieving Kaufman's desired polishing selectivity towards titanium. See In re O'Farrell, 853 F.2d 894, 903-04, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988) (for obviousness under section 103, a reasonable expectation of success is required). Under these circumstances, it is apparent that the examiner has erroneously concluded "it is [sic, would have been] obvious to replace [Kaufman's] hydrogen peroxide with Farkas's [sic] oxidizers, such as ammonium cerium nitrate and ammonium cerium sulfate" (see the last page of the answer).

It follows that we cannot sustain the examiner's section 103 rejection of all appealed claims as being unpatentable over Kaufman and Farkas.

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The decision of the examiner is reversed.

Bradley R. Garris	)	
Administrative Patent Judge	)	
	)	
	)	
	)	
Romulo H. Delmendo	)	BOARD OF PATENT
Administrative Patent Judge	)	APPEALS AND
	)	INTERFERENCES
	)	
	)	
Jeffrey T. Smith	)	
Administrative Patent Judge	)	

BRG:tdl

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