

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte MARK R. VISOKAY,  
ANTONIO L. P. ROTONDARO,  
and LUIGI COLOMBO

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Appeal No. 2005-1503  
Application 10/165,888

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ON BRIEF

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Before GARRIS, TIMM and PAWLIKOWSKI, Administrative Patent Judges.

PAWLIKOWSKI, Administrative Patent Judge.

**DECISION ON APPEAL**

This is a decision on appeal, under 35 U.S.C. § 134, from the examiner's final rejection of claims 1 through 9. A copy of claims 1, 3, 7, and 9 is set forth in the attached appendix.

Claim 9 stands rejected under 35 U.S.C. § 112, second paragraph.

Claims 1, 2, 4, and 9 stand rejected under 35 U.S.C. 102(e) as being anticipated by Duncombe.

Claims 3, 5, and 6 stand rejected under 35 U.S.C. § 103 as being obvious over Duncombe in view of Ma.

Claims 7 and 8 stand rejected under 35 U.S.C. § 103 as being obvious over Duncombe in view of Lin.

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The examiner relies upon the following references as evidence of unpatentability:

Keeble*	4,844,775	July 4, 1989
Duncombe et al. (Duncombe)	6,255,122	July 3, 2001
Ma et al. (Ma)	6,348,373	Feb. 19, 2002
Lin et al. (Lin)	6,458,695	Oct. 1, 2002

\*The examiner uses Keeble in applying Duncombe.

On page 3 of the brief, appellants state that the claims are grouped according to the rejections. We therefore consider claims 1, 3, 7, and 9 in this appeal. See former regulation 37 CFR § 1.192(c)(7)(2003), and compare current regulation 37 CFR § 41.37(c)(1)(vii)(September 13, 2004). Also see Ex parte Schier, 21 USPQ2d 1016, 1018 (Bd. Pat. App. & Int. 1991).

We have carefully reviewed appellants' brief, the examiner's answer, and the evidence of record. This review has led us to the following determinations.

#### OPINION

##### I. The 35 U.S.C. § 112, second paragraph rejection of claim 9

We consider claim 9 in this rejection.

On page 3 of the answer, the examiner rejects claim 9 as being indefinite and states that this claim is an omnibus type claim. In reply, on page 4 of the brief, appellants state that claim 9 "is specific to the regions shown in the figure and thus is not an omnibus claim".

On page 4 of appellants' specification, Figure 4 is described as a Gibbs diagram showing useful gate dielectric compositions made of HF, SI, and O. The specification indicates that the composition regions indicated by broken and solid line

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boundaries (which include oxygen deficient high-k compounds) avoid the  $\text{HfO}_2$  and  $\text{HfSiO}_4$  stoichiometric compositions, which are likely to be easily crystallizable. Nitrided versions would start with oxygen-deficient regions in Figure 4. See page 4, second full paragraph, of appellants' specification, and Figure 4.

Upon our review of appellants' Figure 4, Figure 4 indicates which compounds are excluded by the broken line boundaries. However, the area enclosed by the broken line boundaries is indicated as "approximate" stoichiometry. Also, there is no other information as to what is included/enclosed by the broken line boundaries. In this way, we agree with the examiner that claim 9 is indefinite under 35 U.S.C. § 112, second paragraph.

In view of the above, we therefore affirm the 35 U.S.C. § 112, second paragraph rejection, of claim 9.

II. The 35 U.S.C. § 102(e) rejection of claims 1, 2, 4 and 9

We consider claim 1 in this rejection.

The examiner's position for this rejection is set forth on pages 3 through 4 of the answer. The examiner states that he broadly interprets "ion bombardment" to encompass exposure to oxidizing gases. The examiner also particularly notes Duncombe's use of chemical vapor deposition. The examiner then discusses Keeble as exemplary for showing that in a chemical vapor deposition, gases that enter a chamber can be energized by means of a plasma, to promote the reaction. Excited ions are drawn toward a substrate and impact the substrate at high speed (ion bombardment). Answer, page 4.

Hence, it appears that the examiner's position is two-fold.

First, the examiner finds that Duncombe teaches, in column 3, beginning at line 16, that step(c) involves annealing an amorphous dielectric material. This annealing step is described

in column 5 beginning at line 17. The annealing step is carried out at a temperature of from about 150°C to about 450°C, and oxidizing gases, such as oxygen, are typically employed in the annealing step. See column 5, lines 28-31 of Duncombe. It appears that the examiner views the employment of these oxidizing gases in the annealing step as some form of ion bombardment.<sup>1</sup>

Second, the examiner finds that Duncombe's use of a chemical vapor deposition process, is ion bombardment, in light of Keeble. We also determine that this aspect of the examiner's position is unsupported by the evidence, for the following reasons.

The examiner refers to column 5, lines 1 through 4 of Duncombe, for teaching amorphizing a dielectric layer by ion bombardment. This is because the examiner believes that the disclosed process therein, of chemical vapor deposition, is in fact, amorphizing a dielectric layer by ion bombardment, in light of Keeble. We disagree.

We note that Duncombe teaches, in column 4, line 66 through column 5, line 8, a variety of suitable deposition processes. One skilled in the art would first have to choose chemical vapor deposition from among the described processes. Then, one skilled in the art would have to choose the particular kind of chemical vapor deposition as described in Keeble. That is, Keeble describes a chemical vapor deposition process that consists of introducing certain gases into a chamber, wherein the substrate can be heated in order to promote the reaction, or alternatively, the gases can be energized by means of a plasma to promote the reaction. Keeble then states that the use of low energy ion bombardment of the surface during the process will supply surface energy to greatly improve the film quality.

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<sup>1</sup> We disagree with the examiner's position, and agree with appellants' position as set forth on page 3 of the brief, that "annealing is not ion bombarding".

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We refer to the case of In re Arkley, 455 F.2d 586, 590, 172 USPQ 524, 526 (CCPA 1972). In this case, it is indicated that for a proper anticipation rejection, the reference must clearly and unequivocally disclose the claimed invention without any need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the reference. In the instant case, many different deposition processes are provided in Duncombe, and Keeble is yet another type of chemical vapor deposition process. As such, we determine that because of these multiple choices, there is a need for picking and choosing.

In view of the above, we therefore reverse the anticipation rejection of claims 1, 2, 4, and 9.

III. The 35 U.S.C. § 103 rejection of claims 3, 5, and 6 as being obvious over Duncombe in view of Ma

We consider claim 3 in this rejection.

The examiner's position for this rejection is set forth on page 5 of the answer. Appellants' position for this rejection is set forth on page 3 of the brief.

Appellants repeat the aforementioned deficiencies of Duncombe. Appellants also argue that the process in Ma involves subsequent annealing, for recrystallization, prior to gate deposition. Brief, page 3.

As discussed, supra, Duncombe does not disclose ion bombardment. Because Duncombe does not teach ion bombardment, there is no motivation to incorporate the specific type of ion bombardment as set forth in Ma.

In view of the above, we therefore reverse the 35 U.S.C. § 103 rejection of claims 3, 5, and 6 as being obvious over Duncombe in view of Ma.

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IV. The 35 U.S.C. § 103 rejection of claims 7 and 8 as being obvious over Duncombe in view of Lin

We consider claim 7 in this rejection.

The examiner's position for this rejection is set forth on page 6 of the answer. Appellants' position is set forth at the bottom of page 3 and at the top of page 4 of the brief.

Appellants argue the same arguments regarding the aforementioned deficiencies in Duncombe. Appellants argue that Lin adds nothing regarding the ion bombardment required by claim 1.

As discussed, supra, Duncombe does not disclose ion bombardment. Lin does not cure this deficiency of Duncombe.

Hence, for the reasons discussed, supra, we also reverse the 35 U.S.C. § 103 rejection of claims 7 and 8 as being obvious over Duncombe in view of Lin.

V. Conclusion

The 35 U.S.C. § 112, second paragraph, rejection is affirmed.

Each of the art rejections is reversed.

No time period for taking any subsequent action in

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connection with this appeal may be extended under 37 CFR  
§ 1.136(a)(1)(iv)(effective Sept. 13, 2004; 69 Fed. Reg. 49960  
(Aug. 12, 2004); 1286 Off. Gaz. Pat., Office 21 (Sept. 7, 2004)).

**AFFIRMED-IN-PART**

Bradley R. Garris	)	
Administrative Patent Judge	)	
	)	
	)	
	)	BOARD OF PATENT
Catherine Timm	)	APPEALS AND
Administrative Patent Judge	)	INTERFERENCES
	)	
	)	
	)	
Beverly A. Pawlikowski	)	
Administrative Patent Judge	)	

BAP/cam

**APPENDIX**

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1. A method of fabrication of an integrated circuit, comprising the steps of:

providing a substrate;

forming a high-k dielectric layer on said substrate;

amorphizing said dielectric layer by ion bombardment;

forming gate material on said amorphized dielectric layer; and

forming gates from said gate material.

3. The method of claim 1, wherein:

said ion bombardment of step (c) of claim 1 is exposure to a plasma.

7. The method of claim 1, further comprising prior to said forming gate material of step (d) of claim 1, forming dummy gates on said dielectric layer and removing said dummy gates.

9. The method of claim 2, wherein:

said metal silicate is within one of the two rectangular regions bounded by broken lines in Figure 4.

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