UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HOWARD E. RHODES
And
STEVEN D. CUMMINGS

Appeal 2007-2285
Application 10/871,151
Technology Center 2800

Decided: October 29, 2007

Before EDWARD C. KIMLIN, BRADLEY R. GARRIS, and TERRY J. OWENS, *Administrative Patent Judges*.

KIMLIN*, Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-40. Claim 1 is illustrative:

1. An interconnect structure, comprising:

a conductive reactive layer disposed on a substrate;

a conductive barrier layer comprising tantalum nitride disposed directly on the conductive reactive layer;

a copper layer disposed directly on the conductive barrier layer; and

an anti-reflective layer comprising tantalum nitride disposed directly on the copper layer.

The Examiner relies upon the following references as evidence of obviousness:

Fillipiak	5,918,147	Jun. 29, 1999
Xu	6,217,721 B1	Apr. 17, 2001

The present application is a continuation of U.S. Serial No. 08/815,031. An appeal was taken in the parent application on claims very much like the ones presently before us, the difference being that the present claims require various layers to be disposed directly on another layer. In a decision dated January 29, 2004, the Board affirmed the Examiner's rejection over Fillipiak in view of Xu, the sole rejection now before us (Appeal No. 2003-2093).

Appealed claims 1-40 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fillipiak in view of Xu.

With the exception of claims 9 and 29, Appellants do not separately argue the appealed claims. Accordingly, claims 1-8, 10-28, and 30-40 stand or fall together.

We have thoroughly reviewed each of Appellants' arguments for patentability. However, for the reasons set forth by the Examiner and the Board in the prior appeal, we conclude that the claimed subject matter would have been obvious to one of ordinary skill in the art within the meaning of

Section 103 in view of the applied prior art. Since the difference between the claims presently on appeal and those before the Board in the prior appeal does not affect the reasoning set forth in the prior Board decision, we will sustain the Examiner's rejection.

We appreciate that Fillipiak does not expressly teach the presence of a layer of tantalum nitride between the tantalum and copper layers, but we remain of the opinion that "Xu evidences the obviousness of employing a tantalum nitride layer between the tantalum and copper layers of Fillipiak for the purpose of providing the benefits taught by Xu, e.g., resistance to electrode migration" (sentence bridging pages 8-9 of prior decision). Also, as explained by the Examiner, "it would have been obvious to modify the interconnect structure of Fillipiak by forming a TaN layer between the tantalum layer 106 and the copper base layer 108, because as taught by Xu, such TaN would provide highly [sic, high] conductivity, and highly smooth surface (col. 28, ll. 6-11)"(Answer 4, first para., last sentence).

We find no merit in Appellants' argument that Xu actually states that TiN provides good conductivity and a highly smooth surface, and that "the qualities of 'good conductivity' and a 'smooth surface' are properties of TiN, not TaN" (Principal Br. 12, first para.). According to Appellants, the cited art does "not suggest that it is desirable to a TaN layer for the purpose of providing a smooth surface and high conductivity" (id.)[sic]. We fully concur with the Examiner that one of ordinary skill in the art would have reasonably expected that the advantages specifically associated with TiN would have transferred to the compound that Xu teaches is a viable substitute when copper is used as the interconnect metal, namely, TaN (see

col.. 28, ll. 6-13). Xu provides no teaching whatsoever that the advantageous properties of good conductivity, highly smooth surface and resistance to electrode migration are only associated with TiN. To conclude otherwise would render meaningless the reference teaching of any substitute material.

We are also not persuaded by Appellants' argument that Fillipiak teaches away from the addition of a TaN layer because the reference teaches that Ta layer 106 is a barrier layer. We conclude that it would have been obvious for one of ordinary skill in the art to use a combination of Ta and TaN as a barrier layer or layers for the purpose of achieving the benefits of TaN disclosed by Xu.

As for separately argued claims 9 and 29 which recite "the aluminum/copper alloy comprises about 99.5% aluminum and 0.5% copper", Appellants acknowledge that Xu expressly teaches that the aluminum may be alloyed with other metals, such as copper, in an amount of up to 10%. While Appellants query "why one of ordinary skill in the art would be motivated to select a copper-aluminum alloy, let alone a 99.5% aluminum – 0.5% copper alloy, from the myriad alloys disclosed by the Xu reference" (Principal Br. 15), the answer lies in the fact that the reference specifically suggests as much. Manifestly, up to 10 weight percent includes the claimed 0.5%, and an alloy of aluminum-copper is the first alloy listed in the group.

As a final point, we note that Appellants base no argument upon objective evidence of nonobviousness, such as unexpected results, which

would serve to rebut the inference of obviousness established by the applied prior art.

In conclusion, based on the foregoing and the reasons well stated by the Examiner, the Examiner's decision rejecting the appealed claims is affirmed.

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

AFFIRMED

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