Filed on behalf of Godo Kaisha IP Bridge 1

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY, LTD.
and GLOBALFOUNDRIES U.S. INC.,
Petitioners,

v.

GODO KAISHA IP BRIDGE 1,
Patent Owner.

Case IPR2016-01249[1]
U.S. Patent No. 6,538,324

PATENT OWNER'S REQUEST FOR REHEARING

[1] GlobalFoundries U.S. Inc.'s motion for joinder in Case IPR2017-00919 was granted.

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The Final Written Decision ("FWD")(Paper 47) finds claims 1–3, 5–7, and 9 ("Challenged Claims") of U.S. Patent No. 6,538,324 (the "'324 patent") unpatentable as obvious over *Ding* in view *Zhang*; finds proposed Substitute Claims 11 and 12 unpatentable; and finds proposed Substitute Claim 13 patentable.

Patent Owner asserts the Board overlooked and misapprehended pertinent disclosure in *Ding* and *Zhang*, and Patent Owner's arguments regarding the proposed combination of *Ding* and *Zhang*, and respectfully requests rehearing.

I. The Board Overlooked Patent Owner's Arguments That *Zhang* Teaches The Desirability Of An Upper Surface Of Pure Tantalum

The Board stated:

> The Patent Owner Response contains numerous arguments that are premised on Zhang **requiring** pure tantalum and prohibiting nitrogen at the upper surface of the first conductive film. *See*, *e.g.*, …. **All of these arguments are inapposite in light of our determination that Zhang teaches nitrogen in the tantalum-rich tantalum nitride film, including at its upper surface**. See Ex. 1004, 3:53–62. **Accordingly, such arguments are not further addressed in this Decision**.

FWD (Paper 47), pp. 20-22 (emphasis added).

The Board misapprehended Patent Owner's arguments. Patent Owner did not argue that *Zhang* requires an upper surface of pure tantalum. Rather, Patent Owner argued that *Zhang* taught the desirability of an upper surface of pure tantalum. Arguments pertaining to the "desirability" of forming a film having a

surface of pure tantalum are present throughout Patent Owner's remarks, such as, "Both *Ding* and *Zhang* teach the ***desirability*** of forming a film having a surface of pure tantalum to contact a copper film." PO Response (Paper 14), p. 21 (emphasis added); "A PHOSITA would not have modified *Ding* in view of *Zhang* to add nitrogen to *Ding's* pure tantalum layer as it is contrary to both *Ding's* and *Zhang's* teaching of the ***desirability*** of forming a film with a surface that is pure tantalum for contacting a copper layer." *Id.* (emphasis added); "Both *Ding* and *Zhang* teach the ***desirability*** of forming a film having a surface of pure tantalum, *i.e.*, with no nitrogen." PO Response, p. 22 (emphasis added); *see also* PO Response, stating "desirability" on pp. 28, 30, 31, 32, 34 and 35.

The Board further overlooked embodiments in *Zhang* having (1) an entire top film that does not contain nitrogen, and (2) an upper surface that does not contain nitrogen. PO Response, pp. 28-29. Even Petitioner acknowledges that "*Zhang* discloses an embodiment in which the top film of the two-layer diffusion barrier (the copper side) is a 'tantalum-rich tantalum nitride film' that has an upper surface which is 'substantially pure tantalum.'" Petition (Paper 2), p. 14. Patent Owner specifically argued *Zhang's* embodiments with substantially pure tantalum:

> *Zhang* also teaches the desirability that "the upper surface of the tantalum rich tantalum nitride film is substantially pure tantalum and **has essentially no nitrogen atoms**." *Id.*, 3:54-57 (emphasis added);

> *see also* Petition, p.16 ("*Zhang* discloses an embodiment in which the top film of the two-layer diffusion barrier is a 'tantalum-rich tantalum nitride film' that has an upper surface which is 'substantially pure tantalum.'"). *Zhang* further discloses an embodiment where the second portion of the first conductive film consists of pure tantalum. *Id.*, 3:62-64 ("the nitrogen-containing and inert gases can be terminated and the chamber evacuated before flowing just the inert gas."). Evacuating the nitrogen from the chamber after the tantalum nitride film has been formed, and then flowing just the inert gas would result in a film of pure tantalum that has essentially no nitrogen atoms. Exhibit 2011, ¶¶114-115.

PO Response (Paper 14), pp. 28-29.

> *Zhang* discloses two processes when forming film 32 during the sputtering process. In one process, after the tantalum nitride film 22 is formed, the nitrogen flow is terminated while the inert gas continues to flow. *Id.*, 3:44-46; *see also* Fig. 4. This process forms a film with a surface of pure tantalum. In the other process, after the tantalum nitride film 22 is formed, the nitrogen and argon gas flows are terminated, the chamber is evacuated (*i.e.*, remove all gases, including the nitrogen gas), and the process continues with only the inert gas. This process forms a film of pure tantalum. *Id.*, 3:62-64. Exhibit 2011, ¶119. Thus, a PHOSITA reading *Zhang* would understand the ***desirability*** of forming film 32 with a surface of pure tantalum. Exhibit 2011, ¶¶118-120.

PO Response (Paper 14), pp. 29-30 (emphasis added).

By overlooking these *Zhang* embodiments with pure tantalum in the top film

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