Paper No. __

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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TAIWAN SEMICONDUCTOR MANUFACTURING CO., LTD,
Petitioner,

v.

GODO KAISHA IP BRIDGE 1,
Patent Owner.

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Case IPR2017-01843[1]
Patent 7,893,501

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**PATENT OWNER'S SUR-REPLY**
**PURSUANT TO PAPER NO. 40**

[1] IPR2017-01844 has been consolidated with this proceeding. *See* Paper 10 at 3.

## TABLE OF CONTENTS

# TABLE OF AUTHORITIES

## CASES

## I. PETITIONER'S IMPROPER NEW REPLY ARGUMENT FAILS

The Reply cited Misra 6:54-58 (not cited in the Petition) to support the new argument that Misra teaches that spacers 23 can be "made of a thermally grown silicon dioxide[2] rather than silicon nitride." Reply at 4 (citing Ex. 1232, ¶10 where Shanfield quotes Misra 6:54-58 in full and opines "***[t]his disclosure*** [Misra 6:54-58] refers to a silicon oxide formed ***on top of*** the silicide layer" from "thermally-driven diffusion of excess silicon in the silicide."). Petitioner and Shanfield are wrong about what this newly cited section of Misra discloses.

### A. Silicon Oxide Spacers Cannot Be Thermally Grown "On Top of The Silicide Layer"

First, spacers 23 ***cannot be formed "on top of silicide layer"*** 18 because the top of silicide layer 18 is not exposed when spacers 23 are formed. Misra, Figs. 5-7. As shown in Figs. 2-3, "***silicide layer 18 within the opening 24 is etched away***" and "***remove[d]***" so sacrificial oxide 25 can thermally grow on the silicon substrate. *Id.* at 5:43-67, 6:34-36. Spacers 23 are formed "on top of the ***sacrificial oxide 25***" in locations from which silicide layer 18 was ***removed***—not "on top of the silicide layer" as Shanfield erroneously alleged. *Id.* at 6:37-42.

[2] The Reply and Ex. 1232 refer to silicon oxide and silicon dioxide. Both would be understood by a POSA to refer to $SiO_2$ in this field. Regardless, arguments in this brief apply to whichever oxide of silicon allegedly replaces silicon nitride ("SiN").

Second, silicon oxide spacers cannot grow by "thermally-driven diffusion" on oxide 25. *See* Sec. I.B. Thus, "thermally-driven diffusion" cannot form silicon oxide spacers 23 in Misra's spacer embodiment (Fig. 7). *Compare* Ex. 1232, ¶10.

Third, SiN layer 20 "is deposited ***overlying*** … silicide [] 18." Misra 5:20-22, Figs. 2-7. Because SiN is a diffusion barrier, ***preventing oxidation of the silicide***, silicon oxide cannot thermally grow on top of silicide 18 which is covered by SiN.

Fourth, Shanfield mischaracterizes Misra as disclosing an inoperable device. If spacers 23 were somehow thermally grown silicon oxide on top of silicide layer 18 as Shanfield suggests (*i.e.*, if in Fig. 7 spacers 23 were silicon oxide, and elements 25 were silicide), the silicide under the spacers would electrically connect (short) gate 28b to source 26 and drain 28, rendering the device inoperable. *Id.* 6:49-54 (spacers required to isolate the gate from silicide).

**B. Misra Teaches Only Silicon Nitride Spacers 23**

"***After*** formation of the spacers," ion implantation is used to dope region 31. Misra 6:42-58. A POSA would have understood this also "***dopes***" spacers 23 and ***decreases their ability to isolate the gate***. Misra teaches the damaged SiN spacers may be replaced with (1) ***new*** SiN spacers or (2) ***new*** SiN spacers "composited with a sidewall thermal growth" (*i.e.*, prior to re-depositing SiN spacers, silicon oxide is thermally grown on oxide 25 and exposed portions of the lateral surfaces of silicide 18). In both cases, ***silicon nitride*** covers the sides of Misra's gate 28b.

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