

UNITED STATES PATENT AND TRADEMARK OFFICE

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY LTD.  
Petitioner

v.

GODO KAISHA IP BRIDGE 1  
Patent Owner.

Case IPR2017-01843<sup>1</sup>

**REPLY DECLARATION OF STANLEY R. SHANFIELD, PH.D.**

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<sup>1</sup> Case IPR2017-01844 has been consolidated with this proceeding.

I, Stanley R. Shanfield, Ph.D., declare as follows:

1. My name is Stanley R. Shanfield. I have been retained by counsel for Taiwan Semiconductor Manufacturing Company, Ltd. to serve as a technical expert in this *inter partes* review proceeding.

2. My background is set forth in paragraphs 2-12 of my initial Declaration in this proceeding (Ex. 1202<sup>2</sup>). As I explained in paragraphs 2-12 and 34-36 of my initial Declaration, I would have been a person with at least ordinary skill in the art of U.S. Patent No. 7,893,501 (the “501 patent”) as of the time of its alleged invention.

3. Since my prior declaration, I have reviewed Patent Owner’s Preliminary Responses dated November 8, 2017, Patent Owner’s district court infringement contentions (Ex. 1228), the Board’s Decision to Institute dated February 6, 2018, the transcript of my deposition on March 27, 2018 and March 28, 2018 (Exs. 2009 and 2010), the Patent Owner’s Response dated April 20, 2018, the Declaration of Dr. Alexander D. Glew (Ex. 2008), the transcript of Dr. Glew’s deposition (Ex. 1231), and the exhibits submitted in connection with the forgoing.

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<sup>2</sup> Unless otherwise specified with the “-01844” prefix, references to exhibits and papers herein are to those filed in Case IPR2017-01843.

I confirm that everything I included in my prior declaration, and all of the testimony given during my deposition on March 27, 2018 and March 28, 2018 remain true to the best of my knowledge. I have been asked to provide expert testimony in this declaration in reply to issues raised by the Patent Owner's Response ("Response") and the Declaration of Alexander D. Glew (Ex. 2208).

4. Specifically, I understand that, with the exception of the "protruding gate" limitation ("the gate electrode protrudes upward from a surface level of parts of the silicon nitride film located at both side surfaces of the gate electrode"), Patent Owner does not dispute that the instituted grounds expressly disclose every

limitation recited by the challenged claims of the '501 patent. Nor does Patent Owner dispute that the references would have been obvious to combine.

5. For example, there is no dispute that Misra's gate 28b protrudes above Misra's silicon nitride film 20, just as gate 6a protrudes above silicon nitride film 8a in the '501 patent.

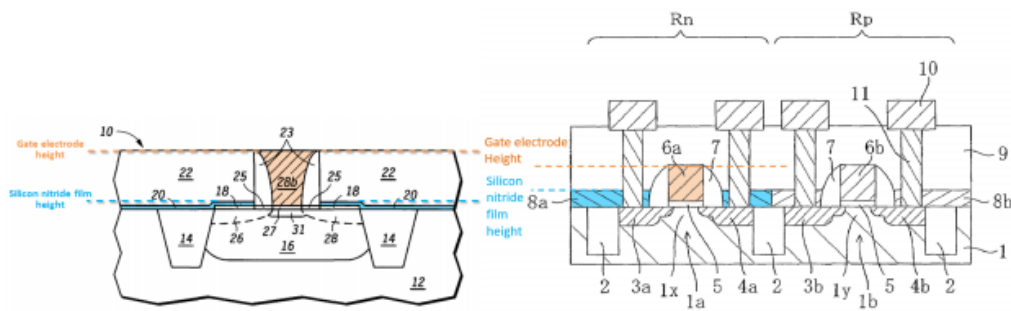


FIG. 7

FIG. 1

Ex. 1202, ¶¶112-114; Petition, 40-42. Instead, Patent Owner argues gate 28b must also protrude above spacers 23 because in some embodiments spacers 23 are also made of silicon nitride.

6. As I will describe below, Patent Owner's arguments incorrectly assume that the spacers 23 are *necessarily* made of silicon nitride. Misra expressly states with regard to spacers 23 that the "nitride spacers formed by deposition *may be replaced* or composited with a *sidewall thermal growth*," Ex. 1204, 6:54-58 (emphasis added), as I confirmed on cross-examination when questioned about this

language. Ex. 2210, 262:6-24. It is therefore undisputed that Misra discloses the “protruding gate” limitation in the embodiments where spacers 23 are replaced with sidewall thermal growth.

7. Moreover, Patent Owner’s arguments do not rebut the showing that Misra discloses the “protruding gate” limitation “regardless of whether spacers 23 are constructed out of silicon nitride.” Ex. 1202, ¶115; Petition, 42. Patent Owner raises the same principal arguments it raised in the POPR. Each argument was already rejected by the Board. First, Patent Owner again incorrectly argues that the “silicon nitride film” includes both the “contiguous” plasma enhanced layer 20 and silicon nitride spacers 23. *See e.g.*, Response, 45. Then, Patent Owner again incorrectly argues that Misra’s gate does not protrude above the parts of the silicon nitride film closest to the gate, which it argues are the silicon nitride spacers 23. *See e.g.*, Response, 71.

8. I provide further explanation below regarding these issues, with which I disagree with the Patent Owner and Dr. Glew.

**I. Patent Owner Does Not Dispute Misra’s Thermally Grown Sidewall Embodiments Discloses the Claimed Protruding Gate**

9. My initial declaration demonstrated that Misra discloses the “protruding gate” limitation because gate 28b protrudes above silicon nitride film

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