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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY, LTD.,
Petitioner,

v.

GODO KAISHA IP BRIDGE 1,
Patent Owner.

Case IPR2016-01376
Patent 6,197,696 B1

Before JUSTIN T. ARBES, MICHAEL J. FITZPATRICK, and JENNIFER MEYER CHAGNON, *Administrative Patent Judges*.

CHAGNON, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Taiwan Semiconductor Manufacturing Company, Ltd. ("Petitioner") filed a Petition for *inter partes* review of claims 13 and 15 ("the challenged claims") of U.S. Patent No. 6,197,696 B1 (Ex. 1001, "the '696 patent"). Paper 2 ("Pet."). Godo Kaisha IP Bridge 1 ("Patent Owner") filed a Preliminary Response to the Petition. Paper 6 ("Prelim. Resp."). Pursuant to our authorization (Paper 7), Petitioner filed a Reply (Paper 9, "Reply") and Patent Owner filed a Sur-Reply (Paper 10, "Sur-Reply"), directed to the issue of the parties' respective burdens of production if disputes arise prior to institution as to whether a challenged claim or cited prior art is entitled to the benefit of an earlier priority date.

We have authority to determine whether to institute *inter partes* review. *See* 35 U.S.C. § 314(b); 37 C.F.R. § 42.4(a). Upon consideration of the Petition, the Preliminary Response, Petitioner's Reply, and Patent Owner's Sur-Reply, and for the reasons explained below, we determine that the information presented shows a reasonable likelihood that Petitioner would prevail on at least one asserted ground with respect to all of the challenged claims. *See* 35 U.S.C. § 314(a). Accordingly, we institute trial as to claims 13 and 15 of the '696 patent.

A. Related Proceedings

The parties indicate that the '696 patent has been asserted in *Godo Kaisha IP Bridge 1 v. Broadcom Ltd.*, No. 2-16-cv-00134 (E.D. Tex. 2016). Paper 4, 2; Pet. 76. Petitioner has filed three additional petitions challenging claims of the '696 patent—namely, in IPR2016-01377, IPR2016-01378, and IPR2016-01379. Pet. 74–75; Paper 4, 2–3.

B. The Applied References and Evidence

Petitioner relies on the following references.

Reference	Date	Exhibit
U.S. Patent No. 6,140,226 ("Grill")	Oct. 31, 2000	Ex. 1005
U.S. Patent No. 5,592,024 ("Aoyama")	Jan. 7, 1997	Ex. 1018

Petitioner further relies on the Declaration of Bruce W. Smith, Ph.D. (Ex. 1002, "Smith Declaration").

C. The Asserted Grounds

Petitioner sets forth its challenges to claims 13 and 15 as follows. Pet. 36–74.

Reference(s)	Basis	Claim(s) Challenged
Grill	§ 103	13
Grill and Aoyama	§ 103	13, 15

D. The '696 Patent

The '696 patent relates to a "method for forming an interconnection structure in a semiconductor integrated circuit." Ex. 1001, 1:5–7. According to the '696 patent, "[a]n object of the present invention is providing a method for forming an interconnection structure in which an insulating film with a low dielectric constant can be formed by an ordinary resist application process." *Id.* at 3:2–5.

The '696 patent describes various embodiments of methods of forming an interconnection structure. *Id.* at Abstract. The manufacturing process for a modified example of the sixth embodiment is depicted in Figures 33(a)–(c), 34(a)–(c), and 35(a)–(c). *Id.* at 29:62–32:9.

Figure 33(a) of the ’696 patent is reproduced below.

Fig. 33 (a)

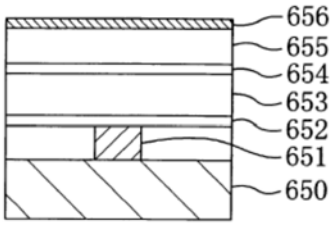

Figure 33(a), reproduced above, is a cross-sectional view of a partially-formed interconnection structure during a process step for forming the same. Ex. 1001, 9:60–63. As seen in Figure 33(a), silicon nitride film 652 is formed over first metal interconnects 651, which are formed on semiconductor substrate 650. *Id.* at 30:1–3. First organic film 653, silicon dioxide film 654, second organic film 655, and titanium nitride film 656 are deposited sequentially. *Id.* at 30:6–16.

Figure 33(b) of the ’696 patent, illustrating a subsequent step in the method of this embodiment, is reproduced below.

Fig. 33 (b)

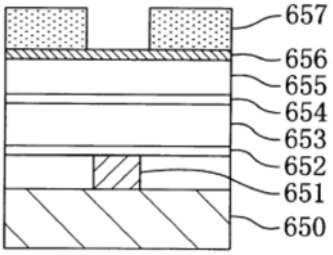

Figure 33(b), reproduced above, is a cross-sectional view of a partially-formed interconnection structure during a process step for forming the same. *Id.* at 9:60–63. In this step, first resist pattern 657 is formed on titanium nitride film 656. *Id.* at 30:36–37. First resist pattern 657 includes openings for forming wiring grooves of the interconnection structure. *Id.*

Figure 33(c) of the ’696 patent, illustrating a subsequent step in the method of this embodiment, is reproduced below.

Fig. 33(c)

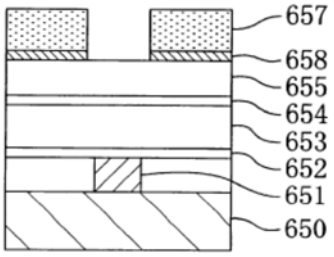

Figure 33(c), reproduced above, is a cross-sectional view of a partially-formed interconnection structure during a process step for forming the same. Ex. 1001, 9:60–63. In this step, titanium nitride film 656 is dry-etched using first resist pattern 657 as a mask, thereby forming mask pattern 658. *Id.* at 30:38–40.

Figure 34(a) of the ’696 patent, illustrating a subsequent step in the method of this embodiment, is reproduced below.

Fig. 34(a)

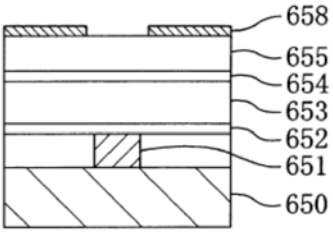

Figure 34(a), reproduced above, is a cross-sectional view of a partially-formed interconnection structure during a process step for forming the same. *Id.* at 9:64–67. In this step, first resist pattern 657 is removed. *Id.* at 30:44–45.

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