

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SONY CORPORATION,  
SAMSUNG ELECTRONICS, CO., LTD.,  
SAMSUNG ELECTRONICS AMERICA, INC., and  
SAMSUNG SEMICONDUCTOR, INC.,  
Petitioner,

v.

RAYTHEON COMPANY,  
Patent Owner.

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Case IPR2016-00209<sup>1</sup>  
Patent 5,591,678

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Before JO-ANNE M. KOKOSKI, JENNIFER MEYER CHAGNON, and  
JEFFREY W. ABRAHAM, *Administrative Patent Judges*.

CHAGNON, *Administrative Patent Judge*.

FINAL WRITTEN DECISION  
*Inter Partes* Review  
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

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<sup>1</sup> Case IPR2016-00962 has been joined with the instant proceeding.

## I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 1–18 of U.S. Patent No. 5,591,678 (Ex. 1001, “the ’678 patent”) are unpatentable.

### A. Procedural History

Sony Corporation (“Petitioner”) filed a Petition (Paper 2, “Pet.”) for *inter partes* review of claims 1–18 (“the challenged claims”) of the ’678 patent. Petitioner included a Declaration of Dr. Richard A. Blanchard (Ex. 1002) to support its positions. Raytheon Company (“Patent Owner”) timely filed a Preliminary Response (Paper 10, “Prelim. Resp.”).

Pursuant to 35 U.S.C. § 314(a), on March 29, 2016, we instituted an *inter partes* review of the challenged claims to determine whether claims 1–4, 6, 7, 10, and 11 are unpatentable under 35 U.S.C. § 102 as anticipated by Liu;<sup>2</sup> whether claims 2–4 and 11 are unpatentable under 35 U.S.C. § 103 as obvious in view of Liu and Black;<sup>3</sup> whether claims 5 and 12–16 are unpatentable under 35 U.S.C. § 103 as obvious in view of Liu and Riseman;<sup>4</sup> whether claim 8 is unpatentable under 35 U.S.C. § 103 as obvious in view of Liu and Oldham;<sup>5</sup> whether claim 10 is unpatentable under 35 U.S.C. § 103 as obvious in view of Liu and Wen;<sup>6</sup> whether claim 9 is unpatentable under

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<sup>2</sup> U.S. Patent No. 4,422,091, issued Dec. 20, 1983 (Ex. 1003).

<sup>3</sup> U.S. Patent No. 4,426,768, issued Jan. 24, 1984 (Ex. 1007).

<sup>4</sup> U.S. Patent No. 4,106,050, issued Aug. 8, 1978 (Ex. 1009).

<sup>5</sup> U.S. Patent No. 4,681,718, issued July 21, 1987 (Ex. 1005).

<sup>6</sup> U.S. Patent No. 3,846,198, issued Nov. 5, 1974 (Ex. 1004).

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35 U.S.C. § 103 as obvious in view of Liu, Wen, and Ying;<sup>7</sup> whether claim 17 is unpatentable under 35 U.S.C. § 103 as obvious in view of Liu, Riseman, and Kusunoki;<sup>8</sup> and whether claim 18 is unpatentable under 35 U.S.C. § 103 as obvious in view of Liu, Riseman, and Oldham. Paper 12 (“Inst. Dec.”).

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 36,<sup>9</sup> “PO Resp.”), along with a Declaration of Dr. Eugene A. Fitzgerald (Ex. 2001<sup>10</sup>) to support its positions. Petitioner filed a Reply (Paper 27, Paper 28 (redacted version), “Pet. Reply”) to the Patent Owner Response. After Petitioner’s Reply was filed, institution was granted in *Samsung Electronics, Co. v. Raytheon Co.*, Case IPR2016-00962, and that proceeding was joined with the instant proceeding. See Paper 29. An oral hearing was held on October 13, 2016. A transcript of the hearing is included in the record. Paper 44 (“Tr.”).

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<sup>7</sup> U.S. Patent No. 3,864,819, issued Feb. 11, 1975 (Ex. 1006).

<sup>8</sup> JP App. Pub. No. 3-108776, published May 8, 1991. Kusunoki is a Japanese-language reference (Ex. 1014). Citations to Kusunoki herein are to the certified English translation submitted by Petitioner (Ex. 1008).

<sup>9</sup> Pursuant to our telephonic authorization, Patent Owner filed a Corrected Patent Owner Response (Paper 36) that corrects specific citations to Dr. Fitzgerald’s Declaration. A red-line version was filed as Exhibit 2030. Paper 36 replaces the originally filed Patent Owner Response (Paper 22), and all citations herein are to the corrected version.

<sup>10</sup> Exhibit numbers 2001–2003 were re-used by Patent Owner at the time of filing the Patent Owner Response. We note this is in violation of 37 C.F.R. § 42.63(c). For clarity, citations herein to Exhibits 2001–2003 are to the documents filed on June 15, 2016.

*B. Related Proceedings*

The '678 patent has been asserted in *Raytheon Co. v. Samsung Electronics Co.*, No. 2:15-cv-00341 (E.D. Tex.), and *Raytheon Co. v. Sony Kabushiki Kaisha*, No. 2:15-cv-00342 (E.D. Tex.). Paper 5, 2; Pet. 1. Petitioner Sony also has challenged the '678 patent in *Sony Corp. v. Raytheon Co.*, Case IPR2015-01201 (“the 1201 IPR”). Pet. 1–2; Paper 5, 2. The '678 patent also has been challenged in *Samsung Electronics, Co. v. Raytheon Co.*, Case IPR2016-00739, which currently is pending.

*C. The '678 Patent*

The '678 patent, titled “Process of Manufacturing a Microelectric Device Using a Removable Support Substrate and Etch-Stop,” relates to a method of fabricating a microelectronic device, in which the microelectronic device is moved from one support to another during fabrication. Ex. 1001, 1:12–13. According to the '678 patent, “[t]he invention permits microelectronic devices to be prepared using well-established, inexpensive thin-film deposition, etching, and patterning techniques, and then to be further processed singly or in combination with other such devices, into more complex devices.” *Id.* at 2:9–14.

Figure 1 of the '678 patent is reproduced below.

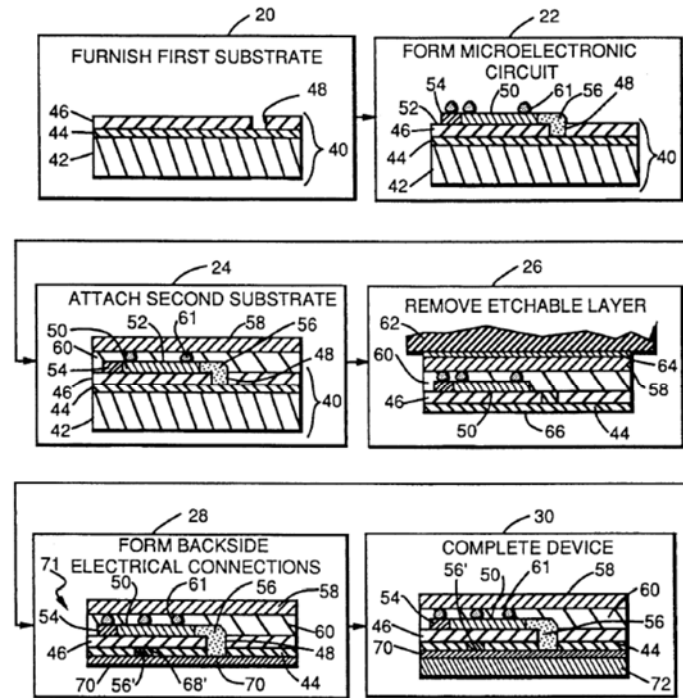


FIG. 1.

Figure 1 is a process flow diagram of the method of the '678 patent, schematically illustrating each stage of fabrication of a microelectronic device formed in accordance with the method. *Id.* at 3:48–50. As shown in box 20, first substrate 40 is provided, the first substrate including etchable layer 42, etch-stop layer 44, and wafer layer 46. *Id.* at 3:65–4:2. As noted in the '678 patent, “[s]uch substrates can be purchased commercially,” or “prepared by applying well-known microelectronic techniques.” *Id.* at 4:2, 4:22–23. In a preferred embodiment, etchable layer 42 is a layer of bulk silicon, etch-stop layer 44 is a layer of silicon dioxide, and wafer layer 46 is a layer of single crystal silicon. *Id.* at 4:3–15.

Microelectronic circuit element 50 is formed in wafer layer 46, as shown in box 22. *Id.* at 4:37–52. The '678 patent notes that “the present invention is not limited to any particular circuit element 50,” and, for

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