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Paper No. 7
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SPTS TECHNOLOGIES LTD.,
Petitioner,

v.

PLASMA-THERM LLC,
Patent Owner.

Case IPR2017-01674
Patent 8,802,545 B2

Before WILLIAM V. SAINDON, ELIZABETH M. ROESEL, and AMANDA F. WIEKER, *Administrative Patent Judges*.

WIEKER, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

SPTS Technologies Limited ("Petitioner") filed a Petition requesting an *inter partes* review of claims 1, 2, 4, and 5 ("the challenged claims") of U.S. Patent No. 8,802,545 B2 (Ex. 1001, "the '545 patent"). Paper 1 ("Pet."). Plasma-Therm LLC ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp.").

We have authority under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted unless the information presented in the Petition and the Preliminary Response shows that "there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314; *see also* 37 C.F.R § 42.4(a) ("The Board institutes the trial on behalf of the Director."). Taking into account the arguments presented in the Preliminary Response, we conclude that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail with respect to challenged claims 1, 2, 4, and 5.

Our factual findings and conclusions at this stage of the proceeding are based on the evidentiary record developed thus far. This is not a final decision as to the patentability of claims for which an *inter partes* review is instituted. Our final decision will be based on the record as fully developed during trial.

B. Related Proceedings

The parties identify no related litigation matters pursuant to 37 C.F.R. § 42.8(b)(2). Pet. 3–4; Paper 3, 1.

The parties identify the following PTAB proceedings related to "sibling patents" of the '545 patent: IPR2017-01314 and IPR2107-01457. Pet. 3–4; Paper 3, 1.

C. The '545 Patent

The '545 patent is titled "Method and Apparatus for Plasma Dicing a Semi-Conductor Wafer" and issued August 12, 2014 from U.S. Application No. 13/412,119, filed March 5, 2012. Ex. 1001, (21), (22), (54).

The '545 patent discloses a method for plasma dicing a semiconductor wafer. *Id.* at (54). Dicing is a process by which individual semiconductor devices (die or chips) are separated from each other after they have been fabricated on a substrate, such as a silicon wafer. *Id.* at 1:23–26, 2:12–14. Dicing can be carried out by mechanical means, such as breaking along scribe lines or sawing, or by plasma etching. *Id.* at 2:14–20, 2:45–47. According to the '545 patent, plasma dicing has a number of benefits over mechanical dicing, but current plasma etching equipment is not suitable for processing substrates that are "fixtured for dicing." *Id.* at 2:55–63, 3:1–16. The '545 patent aims to provide a plasma etching method that is "compatible with the established wafer dicing technique of handling a substrate mounted on tape and supported in a frame." *Id.* at 3:44–46.

Figure 3 of the '545 patent is reproduced below:

Figure 3

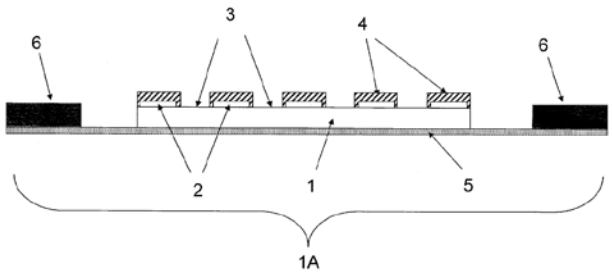

Figure 3 of the ’545 patent is a cross-sectional view of work piece 1A, including substrate 1 adhered to tape 5, which is mounted in rigid frame 6. Ex. 1001, 9:27–29. Substrate 1 has device structures 2 separated by street areas 3. *Id.* at 8:62–9:7; *see also id.* at Fig. 1. Device structures 2 are covered with protective material 4, such as photoresist, while street areas 3 remain unprotected. *Id.* During processing, unprotected street areas 3 of substrate 1 are etched away using a reactive plasma etch process to separate devices 2 into individual die. *Id.* at 9:63–66.

More specifically, the ’545 patent discloses an exemplary method for separating devices 2 into individual die. *Id.* at 7:6–38. The method includes first and second plasma etch processes, each of which can be a time division multiplexed (“TDM”) etch process. *Id.* at 7:16–32. According to the ’545 patent, a “Bosch or TDM” process “alternates between a high rate silicon etch step with a passivation step to control the etch sidewall, [and] is commonly used to etch deep features into silicon.” *Id.* at 1:56–59. In the first plasma etch process, a “work piece is exposed to a first plasma etch process using a first etchant gas.” *Id.* at 7:16–17; *see also id.* at 4:11–20. This first plasma etch process “terminate[s] after the die are singulated . . . using a standard endpoint technique.” *Id.* at 7:21–25. The second plasma etch process uses a second etchant gas and is “a lower etch rate process designed to reduce undercut.” *Id.* at 7:25–28; *see also id.* at 13:41–67 (explaining that undercutting occurs at the substrate-insulator interface and affects performance of the singulated die).

D. Illustrative Claim

The ’545 patent includes five claims, four of which are challenged. Claims 1, 4, and 5 are independent claims. Claim 1 is reproduced below,

reformatted and with bracketed letters [A] – [L] added to correspond to Petitioner's identification of the claim elements:

1. [A] A method for plasma dicing a substrate, the method comprising:

[B] providing the substrate having a top surface and a bottom surface, the top surface having a plurality of device structures and street areas;

[C] applying photoresist to the plurality of device structures and the street areas on the top surface of the substrate;

[D] patterning the applied photoresist to allow the street areas to be unprotected;

[E] placing the bottom surface of the substrate on a carrier support to form a work piece;

[F] loading the work piece into a plasma processing chamber;

[G] exposing the unprotected street areas on the top surface of the substrate of the work piece in the plasma processing chamber to a first plasma time division multiplex process using a first etchant gas;

[H] terminating the first plasma time division multiplex process at a time at which an interface between the bottom surface of the substrate and the carrier support is reached,

[I] said time being determined using an endpoint technique; and

[J] exposing the work piece in the plasma processing chamber to a second plasma time division multiplex process using a second etchant gas,

[K] said exposure of the work piece to the second plasma time division multiplexed process occurring after the termination of the first plasma time division multiplex process and without breaking vacuum from the termination of the first plasma time division multiplex process,

[L] said second etchant gas having a different gas composition from said first etchant gas.

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