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Paper No. 11
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DAIHEN CORPORATION,
Petitioner,

v.

RENO TECHNOLOGIES INC.,
Patent Owner.

Case IPR2019-00248
Patent 9,496,122 B1

Before JEAN R. HOMERE, J. JOHN LEE, and
CHRISTOPHER M. KAISER, *Administrative Patent Judges*.

HOMERE, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Daihen Corporation ("Petitioner") filed a Petition requesting an *inter partes* review of claims 1–12 ("the challenged claims") of U.S. Patent No. 9,496,122 B1 (Ex. 1001, "the '122 patent"). Paper 1 ("Pet."). Reno Technologies, Inc. ("Patent Owner") timely filed a preliminary response. Paper 8 ("Prelim. Resp.").

Section 314(a) of Title 35 of the United States Code provides that an *inter partes* review may not be instituted "unless . . . the information presented in the petition . . . 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(a). On April 24, 2018, the Supreme Court held that, under 35 U.S.C. § 314, we may not institute review of fewer than all claims challenged in the petition. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018). For the reasons expressed below, we determine that, on this record, Petitioner has not established a reasonable likelihood that it would prevail with respect to at least one of the challenged claims. In accordance with 35 U.S.C. § 314(a), we do not institute an *inter partes* review of any challenged claim on any of the grounds alleged in the Petition.

A. Related Proceedings

The '122 patent is not involved in any other judicial or administrative matter that would affect, or be affected by, a decision in this proceeding. Pet. 2; Paper 3, 2.

B. The '122 Patent (Ex. 1001)

The '122 patent relates to a radio frequency (RF) impedance matching network using electronic variable capacitors (EVC) for reducing the time required to match the variable impedance of a plasma chamber to the fixed impedance of an RF source during the fabrication of a semiconductor device, thereby maximizing RF power transmission from the RF source to the plasma chamber. Ex. 1001, 1:14–17, 1:51–54, 2:50–55, 6:5–9. Specifically, as depicted in Figure 1 below, RF matching impedance network (11) includes RF input (13) coupled to RF source (15) having a fixed impedance (e.g., 50 Ohms), and RF output (17) coupled to plasma chamber (19) having a variable impedance. *Id.* at 5:66–6:2. Connected between RF input source (15) and RF impedance matching network (11) is power sensor (21) for monitoring the RF signal output of input source (15). *Id.* at 6:2–5. RF impedance matching network (11) further includes series electronically variable capacitor (EVC) (31) coupled in series between RF input (13) and RF output (17), and shunt EVC (33) coupled in parallel between a ground and one of RF input (13) and RF output (17). *Id.* at 7:66–8:4. Additionally, RF impedance matching network (11) includes control circuit (45) that utilizes the known settings of series EVC (31) and shunt EVC (33) coupled thereto to determine the variable impedance of plasma chamber (19). *Id.* at 3:3–14, 13:55–64. Control circuit (45) uses outputs from EVCs (31, 33) and power sensor (21) to adjust the capacitance values of the EVCs to quickly match the variable impedance of the plasma chamber to the fixed impedance of the RF source such that the time elapsed between determining the variable impedance, to when the RF power reflected back to

the RF source is reduced, is less than 150 microseconds. *Id.* at 7:34–48, 14:25–34.

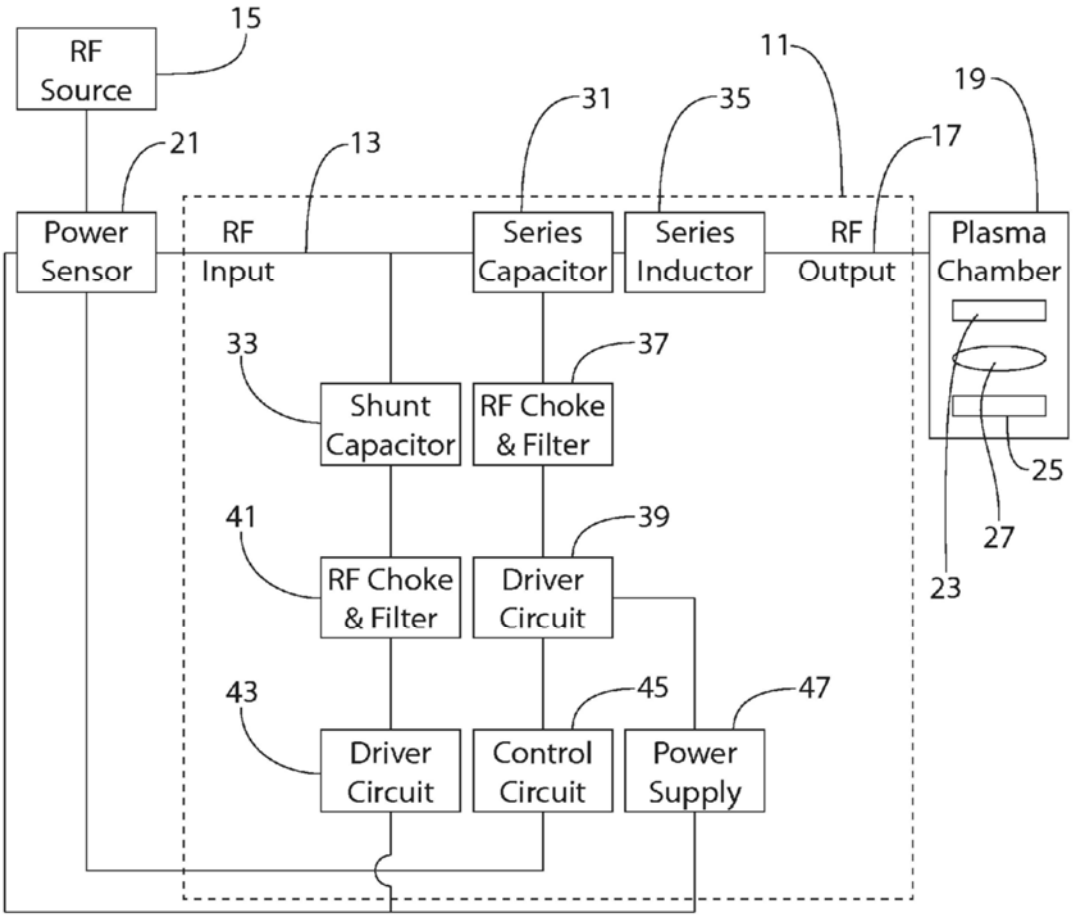

Figure 1 shows an impedance matching network using EVC incorporated into a semiconductor wafer fabrication system. *Id.* at 6:2–5.

C. Illustrative Claim

Of the challenged claims, claims 1, 6 and 10 are independent claims. Claims 2–5 depend from claim 1. Claims 7–9 depend from claim 6. Claims 11 and 12 depend from claim 10. Claim 1 is illustrative and is reproduced below:

> 1. An RF impedance matching network comprising:
> an RF input coupled to an RF source having a fixed impedance;
> an RF output coupled to a plasma chamber having a variable impedance;
> a series electronically variable capacitor having a first variable capacitance, the series electronically variable capacitor electrically coupled in series between the RF input and the RF output;
> a shunt electronically variable capacitor having a second variable capacitance, the shunt electronically variable capacitor electrically coupled in parallel between a ground and one of the RF input and the RF output; and
> a control circuit operatively coupled to the series electronically variable capacitor and to the shunt electronically variable capacitor to control the first variable capacitance and the second variable capacitance, wherein the control circuit is configured to:
> determine the variable impedance of the plasma chamber,
> determine a first capacitance value for the first variable capacitance and a second capacitance value for the second variable capacitance, and
> generate a control signal to alter at least one of the first variable capacitance and the second variable capacitance to the first capacitance value and the second capacitance value, respectively, wherein an elapsed time between determining the variable impedance of the plasma chamber to when RF power reflected back to the RF source decreases is less than about 150 μsec.

Ex. 1001, 16:9–39.

D. Asserted Prior Art and Grounds of Unpatentability

Petitioner, relying upon a declaration of Fred Niell (Ex. 1004), asserts the following challenges:

1. Claims 1– 4, and 6–11 are anticipated under pre-AIA 35 U.S.C. § 102(a) by Zhang.[1] Pet. 4.

[1] Zhang et al. (US 8,513,889 B2, filed Oct. 6, 2010, pub. Aug. 20, 2013) ("Zhang") (Ex. 1006) (cited in IDS during original prosecution).

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