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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RYAN M. SCHMIDT and MOHITH VERGHESE

Appeal 2011-011054
Application 12/398,938
Technology Center 1700

Before CHUNG K. PAK, CHARLES F. WARREN and JEFFREY T. SMITH, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134 from a final rejection of claims 1-3, 5-14, and 16-22. We have jurisdiction under 35 U.S.C. § 6.[1]

Appellants' invention relates to a method of performing atomic layer deposition (ALD) in a deposition chamber comprising a mixer for mixing a reactant gas with a buffer gas. Spec. [0007]. Claim 1 is illustrative:

> 1. A method of performing atomic layer deposition (ALD) in a deposition chamber,

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[1] An Oral Hearing for this appeal was held on February 4, 2013.

the method comprising:

forming a first gas buffer in a first gas line so as to prevent a first gas from reaching a housing, the housing having a first generally tapered surface to form a mixing chamber therein, wherein the first gas is selectively flowable into the mixing chamber;

flowing a second gas through a second gas line and into the mixing chamber while

the first gas buffer is formed;

mixing the second gas with a third gas in the mixing chamber to form a first gas mixture;

swirling the first gas mixture in the mixing chamber;

flowing the first gas mixture into a deposition chamber; and

contacting a substrate in the deposition chamber with at least a portion of the first gas mixture.

Appellants request review of the following rejection from the Examiner's Final Office action:

Claims 1-3, 5-14, and 16-22 rejected under 35 U.S.C. § 103(a) as unpatentable over Park (US 2002/0007790 A1, January 24, 2002) and Murakami et al. (US 5,728,223 issued March 17, 1998 (Murakami)).

OPINION

Appellants' invention is directed to improving the mixing of reactant gases with inert gases prior to undergoing Atomic Layer Deposition (ALD) to prevent uneven deposition of gases. Spec. ¶ [0036].

The dispositive issue on appeal for independent claims 1, 7, and 17 is: Did the Examiner err in determining that a person having ordinary skill in

the art would have configured Park to include a gas mixing chamber as required by the subject matter of independent claim 1, 7, and 17?[2]

We answer this question in the affirmative and, therefore, we reverse.

The Examiner found that Park is directed to an ALD system having first and second mixing portions that ensure the reactants are separated prior to being introduced into a reaction chamber. (Ans. 4-5). To ensure such separation, the Examiner acknowledged that Park does not employ a mixing chamber as required by the claimed invention. (*Id.*). The Examiner found that Murakami uses a mixing chamber for at least two gases for use in any thin film deposition process. (*Id.*). The Examiner found that it would have been obvious to a person of ordinary skill in the art to modify Park to include a gas mixing chamber as described by Murakami in order to produce a mixture of gas with uniform concentration and composition that results of a high quality film. (*Id.* at 6).

Appellants argue that Park is directed to an ALD system having first and second mixing portions that ensure the reactants are separated prior to being introduced into a reaction chamber and Murakami is directed to a CVD system having a single gas mixing chamber in which both reactants and an inert gas are introduced and mixed prior to being injected together into the reaction chamber. (App. Br. 9-10).

Although both types of systems (ALD and CVD) are configured to deposit layers of material on a semiconductor substrate, the Examiner did not demonstrate that the reactions within the mixer(s), the reaction chambers and the manner of deposition of the ALD and CVD systems are not substantially different. We agree with Appellants that it would not have

[2] We limit our discussion to independent claim 1.

been obvious to a person of ordinary skill in the art to replace the two separate mixers taught in Park with a single mixer as taught by Murakami. (App. Br. 11). Park maintains separate flow for each of the reactant gases such that neither reactant gas flows through the common gas line. (Park ¶¶ [0031]-[0035]). Park also provides that discussion comparing the differences between the described ALD process and a conventional CVD process. (*Id.* at ¶¶ [0036]-[0037]). Moreover, Park is concerned with preventing byproducts, such as those that could be formed by using a common mixing chamber, from forming effecting the deposition on a wafer. (I*d.* at ¶ [0005]). On this record, the Examiner did not show that Murakami's common mixing chamber for a CVD system is useful for the ALD system taught by Park which is designed to avoid byproducts such as those that could form from employing the common mixing chamber.

For the reasons set forth above, and those presented by Appellants, the Examiner's rejection is reversed.

ORDER

The rejection of claims -3, 5-14, and 16-22 under 35 U.S.C. § 103(a) is reversed.

REVERSED

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