

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RUSSELL WESTERMAN,
and DAVID J. JOHNSON

Appeal 2008-5889
Application 10/277,261
Technology Center 1700

Decided: December 30, 2008

Before EDWARD C. KIMLIN, CHARLES F. WARREN, and
LINDA M. GAUDETTE, *Administrative Patent Judges*.

KIMLIN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 26, 29, 32-36, 43, 46, and 49-51. Claims 1-25 and 37-42 have been withdrawn from consideration. Claim 26 is illustrative:

26. A method for etching a GaAs semiconductor substrate comprising:

placing the GaAs semiconductor substrate on a first electrode in a vacuum chamber;

providing a process gas to the vacuum chamber;

introducing a radio frequency power coupled to the first electrode at a frequency greater than 13.56 MHz into the vacuum chamber to produce a reactive ion etching plasma from the process gas, generation of the plasma causing a self biasing of the first electrode, the self biasing being reduced by operating at the frequency greater than 13.56 MHz of the radio frequency power source in comparison to operating at a frequency equal to or less than 13.56 MHz;

pulsing the radio frequency power source at a pulse frequency of less than about 50kHz; and

etching the GaAs semiconductor substrate through reactive ion etching by exposing the GaAs semiconductor substrate to said reactive ion etching plasma.

The Examiner relies upon the following references as evidence of obviousness:

Miyakuni	US 5,942,447	Aug. 24, 1999
Savas	US 6,794,301 B2	Sep. 21, 2004
Ishikawa	JP 02-152230 A	Jun. 12, 1990

Appellants' claimed invention is directed to a method for etching a GaAs semiconductor substrate in a vacuum chamber with a reactive ion etching plasma. Radio frequency power is coupled to a first electrode at a frequency greater than 13.56 MHz to produce the reactive ion etching plasma. The radio frequency power source is pulsed at a frequency less than about 50 kHz.

Appealed claims 26, 29, 32-36, 43, 46, and 49-51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Savas in view of Miyakuni and JP '230.

Appellants have not separately argued any particular claim on appeal. Accordingly, all the appealed claims stand or fall together.

We have thoroughly reviewed each of Appellants' arguments for patentability. However, we are in full agreement with the Examiner that the claimed subject matter would have been obvious to one of ordinary skill in the art within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the Examiner's rejection for essentially those reasons expressed in the Answer and we add the following primarily for emphasis.

Appellants do not dispute the Examiner's factual determination that Savas discloses a method for etching a semiconductor substrate by placing the substrate on a first electrode in a vacuum chamber, providing a process gas, introducing a radio frequency power to the electrode at a frequency greater than 13.56 MHz to produce a reactive ion etching plasma from the process gas, self biasing the electrode by generating the plasma wherein the self biasing electrode inherently results from operating at the increased frequency of the radio frequency power source. Nor do Appellants dispute the Examiner's finding that Savas pulses the radio frequency power source at a pulse frequency of less than about 50 kHz.

As acknowledged by the Examiner, Savas does not expressly teach the composition of the semiconductor substrate that is etched and, consequently, does not disclose the presently claimed GaAs semiconductor substrate. While Appellants do not challenge the Examiner's determination

that Miyakuni and JP '230 disclose the reactive ion etching of GaAs substrates, Appellants maintain that one of ordinary skill in the art would not have processed a GaAs substrate in the apparatus of Savas.

Appellants submit that "Savas teaches a plasma etching system that must use two radio frequency power sources to accomplish the high etch rates that are required when etching a silicon substrate" (Br. 10, first ¶). However, we concur with the Examiner that Appellants' argument is not commensurate in scope with the degree of protection sought by the appealed claims. The claimed method recites "comprising" which "opens" the claims to the use of two such radio frequency power sources. In other words, the breadth of the appealed claims encompasses the two radio frequency power sources disclosed by Savas. Likewise, the appealed claims do not preclude inductively coupling power into the plasma as claimed by Savas.

Appellants also contend that "[n]o one skilled in the art would use the teachings of Savas and apply them to the etching of GaAs where the etch rates for the thin films involved require a much lower etch rate" (Br. 10, second ¶). However, as explained by the Examiner, this argument is also not commensurate in scope with the appealed claims which do not recite the etching of thin films or any particular etch rate. The appealed claims recite a GaAs semiconductor substrate of no particular thickness and Appellants have not refuted the Examiner's rationale that the claims embrace GaAs substrates of the type disclosed by JP '230. Appellants have also not rebutted the Examiner's reasoning that since Miyakuni, like Savas, is directed to high density etching methods, it would have been obvious for one of ordinary skill in the art to employ the etching method of Savas on the GaAs thin films of Miyakuni. Appellants have not demonstrated error in the

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Examiner's reasoning that one of ordinary skill in the art would have reasonably expected that the advantages taught by Savas would be attained upon processing the GaAs thin films of Miyakuni.

As a final point, we note that Appellants base no argument upon objective evidence of nonobviousness, such as unexpected results, which would serve to rebut the inference of obviousness established by the applied prior art.

In conclusion, based on the foregoing and the reasons well stated by the Examiner, the Examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(effective Sept. 13, 2004).

AFFIRMED

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