

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* TOSHIAKI FUJII, TSUKURU SUZUKI,  
HIDETOMO SUZUKI, and KAZUHIKO SAKAMOTO

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Appeal No. 1997-1728  
Application No. 08/424,545

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HEARD: October 10, 2000

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Before KIMLIN, PAK, and DELMENDO, *Administrative Patent Judges*.  
DELMENDO, *Administrative Patent Judge*.

*DECISION ON APPEAL*

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 11, which are the only claims remaining in the application.

Claims 1 and 3 are illustrative of the claims on appeal and are reproduced below:

1. A method for preparing a clean gas that is to be brought into contact with a surface of a substrate for preventing said surface against contamination, which method comprises passing air through a prefilter and an air conditioner before introducing into a cleanroom, thereby producing a gas having a concentration of water, a residual amount of fine particles and non-methane hydrocarbons of from 0.5 to 0.8 ppm, then treating the gas in the cleanroom by

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reducing the concentration of water in the gas to 50% (RH) or below by dehumidifying means and thereafter cleaning the gas by dust control means and adsorption and/or absorption means so that the concentration of fine particles in the gas is reduced to class 10 or below and the concentration of non-methane hydrocarbons is reduced to 0.2 ppm or below.

3. A method according to claim 1 wherein said dehumidifying means is a dehumidifier that operates on cooling and/or adsorption.

The subject matter on appeal relates to a method and an apparatus for preparing a clean gas that is to be brought into contact with a surface of a substrate (appeal brief, page 2). The method comprises passing air through a prefilter and an air conditioner before introducing the air into a cleanroom, thereby producing a gas having a concentration of water, a residual amount of fine particles and non-methane hydrocarbons of from 0.5 to 0.8 ppm, then treating the gas in the cleanroom by reducing the concentration of water in the gas to 50% (RH) or below by dehumidifying means and thereafter cleaning the gas by dust control means and adsorption and/or absorption means so that the concentration of fine particles in the gas is reduced to class 10 or below and the concentration of non-methane hydrocarbons is reduced to 0.2 ppm or below (appeal brief, pages 2-3).

As evidence of unpatentability, the examiner relies upon the following prior art references:

Bingham	4,000,990	Jan. 4, 1977
Satoh et al. (Satoh)	5,039,321	Aug. 13, 1991

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Rhodes 5,042,997 Aug. 27, 1991

In our decision below, we also rely on the following newly cited prior art:

Seibert et al. (Seibert)<sup>1</sup> 4,231,768 Nov. 4, 1980

Appellants' admissions relating to "prior art technology" as described in the specification (pages 2-4).

The grounds of rejection presented for our review in this appeal are as follows:

Claims 1, 2, 4 through 8, 10, and 11 stand rejected under 35 U.S.C. § 103 as unpatentable over the combined teachings of Rhodes and Satoh (examiner's answer, page 3); and

Claims 3 and 9 stand rejected under 35 U.S.C. § 103 as unpatentable over the combined teachings of Rhodes, Satoh, and Bingham (examiner's answer, pages 3-4).<sup>2</sup>

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<sup>1</sup> We attach to this decision a copy of this prior art reference, together with a completed PTO-892 form.

<sup>2</sup> Regarding the grouping of claims for the first ground of rejection, the appellants submit that claims 1, 2, 4, and 5 should be considered separately from claims 6 through 8, 10, and 11 (appeal brief, page 5). Further, with respect to the grouping of claims for the second ground of rejection, the appellants state that "[c]laims 3 and 9 do not stand or fall together" (*id.*). We note, however, that the appellants do not explain why claims 6 through 8, 10, and 11 are *separately patentable* from claims 1, 2, 4, and 5. Nor do they indicate why claim 9 is *separately patentable* from claim 3. Therefore, consistent with 37 CFR § 1.192(c)(7) and (c)(8) (1995), we select claims 1 and 3 and decide this appeal as to the examiner's grounds of rejection on the basis of these claims alone.

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We have thoroughly reviewed each of the appellants' arguments for patentability. However, we concur with the examiner that the subject matter of the appealed claims would have been obvious to one of ordinary skill in the art over the prior art within the meaning of 35 U.S.C. § 103. Accordingly, we affirm.

The appellants state:

. . . Appellants have discovered that air purified by such conventional means as disclosed by Rhodes, and as shown in preliminary steps 10, 11 and 12 of Appellants' Figure 1, i.e., gases having an impurity content, such as Class 10,000 fine particle content and 0.5-0.8 ppm non-methane hydrocarbon content, are insufficiently pure for manufacturing semiconductors. [Underscoring original; appeal brief, p. 5.]

Further, the appellants urge as follows:

The above problems concerning the manufacture of semiconductors are not discussed in any of the prior art cited by the Examiner and, as part of the invention as a whole, make the claimed invention patentable. [Appeal brief, p. 8.]

We cannot agree with the appellants.

Rhodes teaches a method for purifying air by using an environmental control system suitable for incorporation into any of various structures including a building having any of numerous uses (e.g., a commercial or office building) (column 1, line 64 to column 2, line 3). Rhodes further states that the environmental control system comprises a heating and air conditioning unit **46**, a humidity controller **47** to provide a

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moisture content of about 35% to about 55%, and an air cleaner **48** (figure 3; column 4, lines 21-29). According to Rhodes, the air cleaner **48** may comprise a pre-filter unit **66** for removing large particulates, a "medium efficient air filter device **68**," a chemical and activated carbon filter device **70** in which additional impurities are removed, and a high efficiency particulate air filter device **72** in which microscopic particles are captured, and, if desired, an electronic air filter device **74** (figure 4; column 4, line 58 to column 5, line 14).

Regarding the purity level of the air, Rhodes teaches as follows:

The air cleaning system has the capability of cleaning in the order of about 99.9% of particles as small as 0.12 micron from the air, including dust, bacteria, mold, pollen, plant spores, lung damaging particles, yeast cells and many viruses. It also controls noxious gases such as nitrogen oxides, oxidants including ozone, sulfur dioxide, and chemical fumes such as formaldehyde. [Col. 2, ll. 21-31.]

The appellants appear to be arguing that conventional air purification means, such as that described in Rhodes, provide air having an impurity content of Class 10,000 and 0.5-0.8 ppm non-methane hydrocarbon content and that such contamination levels render the air to be "insufficiently pure for manufacturing semiconductors" (appeal brief, page 5). Thus, we determine that Rhodes's method for purifying air differs from the method of appealed claim 1 only in that the air is not further treated with

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a dehumidifying means, dust control means, and adsorption and/or absorption means to provide air having Class 10 purity or better and a non-methane hydrocarbon content of 0.2 ppm or below.

In the specification, however, the appellants admit that it was known to one skilled in the relevant art that "fine particles (particulate matter) and gaseous substances such as extremely low concentrations of non-methane hydrocarbons (HCs) in air originating typically from automotive emission gases are of importance as contaminants" in cleanrooms at semiconductor manufacturing facilities and must be removed (specification, page 2, lines 13).<sup>3</sup> In addition, Seibert shows that it was known to provide clean dry air (e.g., pharmaceutical quality air) which is essentially free from moisture, hydrocarbons, and particulates using a purification system comprising an oil and water droplet coalescing filter, a water vapor and hydrocarbon aerosol

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<sup>3</sup> According to *Filter Products for the Semiconductor Industry: Gas Filtration-Purification*, Pall Corp., at [http://www.pall.com/catalogs/microelec/gas/gas\\_purification/asp](http://www.pall.com/catalogs/microelec/gas/gas_purification/asp) (last visited October 13, 2000), attached herewith, purity in gases for semiconductor manufacturing is essential (page 1 of 9). The literature shows that filters available in commerce remove contaminants such as particles, water, and volatile hydrocarbons to 0.003 micron absolute, less than or equal to 10 ppb moisture concentration above the influent, and total hydrocarbon content less than or equal to 100 ppb, respectively (page 5 of 9). In the event of further prosecution, both the examiner and the appellants should investigate whether these commercially available filters constitute prior art within the meaning of 35 U.S.C. § 102.

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adsorbent desiccant dryer, an oil vapor adsorber for removing hydrocarbon vapor, an after-filter for removing relatively large particulates, and a final filter for removing particles of bacterial dimensions (column 1, line 58 to column 2, line 11; column 2, line 66 to column 3, line 13; column 14, lines 35-43; column 25, lines 41-46). Although Seibert discloses that the effluent air after the oil vapor adsorber has a total hydrocarbon content of 1.80 to 1.90 ppmC, the level of hydrocarbon content can be adjusted by varying the length of the sorbent bed (column 14, lines 35-43). In this regard, the appellants have admitted that the adsorber used in the claimed invention is conventional (specification, page 14, lines 24-27; Paper No. 5, declaration of Mr. Toshiaki Fujii filed April 30, 1996). Further, Seibert teaches that the pore size of the final filter membrane may be as low as 0.3 micron (column 21, lines 13-18), which would appear to exceed the airborne concentration limit for Class 10 cleanrooms.<sup>4</sup>

Thus, in addition to the reasons provided by the examiner, it would have been *prima facie* obvious for one of ordinary skill in the art to further purify the air provided by the system of Rhodes at the point of use (i.e., in the cleanroom) using conventional air purification equipment such as that shown in

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<sup>4</sup> See *Classification of Cleanrooms* at <http://www.s2c2.co.uk/cccs.html> (last visited October 12, 2000), attached herewith, for the meaning of a "Class 10 cleanroom."

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Seibert, with the reasonable expectation of achieving the desired humidity level as taught by Rhodes and eliminating virtually all of the deleterious contaminants (e.g., hydrocarbon vapors and particulates) from the environment in the cleanroom. The person of ordinary skill in the art would have been motivated to conduct the further purification at the point of use (i.e., at the cleanroom) to ensure the desired moisture level and the complete removal of any contamination that may accumulate in the air lines and the atmosphere within the building (Seibert's column 1, line 64 to column 2, line 11; column 2, lines 45-56).

As to appealed claim 3, the use of a desiccant dryer as shown in Seibert would meet the claim limitation requiring a dehumidifier that operates on adsorption (Seibert's column 4, lines 11-15).

Relying on the declaration of Mr. Toshiaki Fujii filed April 30, 1996, the appellants argue that they made two discoveries not recognized by the prior art. Mr. Fujii declares as follows:

First, Applicants discovered that air purified by such conventional means as disclosed by U.S. [Patent] 4,000,990 to Rhodes and as shown in steps 10, 11 and 12 of Figure 1 of the above-identified application, i.e., gases having a residual impurity content following such treatment, such as Class 10,000 fine particle content and 0.5-0.8 ppm non-methane hydrocarbon content, are insufficiently pure for manufacturing semiconductors. Persons skilled in the art before Applicants' invention believed that higher impurity content gases as

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described above were sufficiently pure for this application. Second, Applicants discovered that the purification which they have obtained could be accomplished using a combination of conventional dehumidifying means, dust control means, and adsorption and/or absorption means, which accomplishment could not have been expected by persons skilled in the art. [Underscoring original; pp. 1-2.]

Notwithstanding Mr. Fujii's statements, the present specification, as pointed out above, admits that it was known to one of ordinary skill in the art that hydrocarbons and particulates were detrimental to semiconductor manufacturing and that these contaminants should be removed. Accordingly, one of ordinary skill in the art would have been motivated to remove *all* of the particulate and hydrocarbon contaminants to the extent possible using conventional air purification systems. Here, it is our view that the discovery of the problem (i.e., the presence of particulate and hydrocarbon contaminants), as described in the declaration, involves only simple observation of the semiconductors to ascertain the problem in view of the prior art knowledge that particulates and hydrocarbons are detrimental contaminants in semiconductor manufacturing. In such a situation, the proposition that an unobvious aspect of the invention may reside in the discovery of the problem does not apply. *In re Ludwig*, 353 F.2d 241, 243-44, 147 USPQ 420, 421-22 (CCPA 1965).

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Contrary to Mr. Fujii's allegation that one of ordinary skill in the art would not have expected that a combination of conventional equipment would be capable of achieving the claimed purity levels, it was known in the art that conventional purification equipment can provide high purity gases, as shown in Seibert. In this regard, we note that Mr. Fujii's allegations are merely conclusory statements unsupported by factual evidence. *In re Lindner*, 457 F.2d 506, 508, 173 USPQ 356, 358 (CCPA 1972) ("Mere conclusory statements in the specification and affidavits are entitled to little weight when the Patent Office questions the efficacy of those statements.").

The appellants argue that Rhodes does not recognize that prior dehumidification improves adsorption performance and extends the life of the adsorbent (reply brief, page 2). However, we note Seibert's suggestion that coadsorption of water and hydrocarbon vapors by the desiccant dryer, which is located before the oil vapor adsorber, extends the life of the adsorbent in the oil vapor adsorber (column 10, lines 57-63). It follows then that the performance of the adsorbent in the oil vapor adsorber would also be improved as a necessary consequence.

The decision of the examiner is affirmed. However, we designate our affirmance as a new ground of rejection under 37 CFR § 1.196(b) (1997) because we have relied on a newly cited

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prior art reference and the appellants' admitted prior art to support the examiner's position. By this process, we are affording the appellants with all of the procedural safeguards of the rule, including an opportunity to respond to this new ground of rejection with any amendment, argument, or evidence as may be appropriate.

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 1.196(b) (1997). 37 C.F.R. § 1.196(b) provides that, "A new ground of rejection shall not be considered final for purposes of judicial review."

37 C.F.R. § 1.196(b) also provides that the appellants, *WITHIN TWO MONTHS FROM THE DATE OF THE DECISION*, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of proceedings (§ 1.197(c)) as to the rejected claims:

(1) Submit an appropriate amendment of the claims so rejected or a showing of facts relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the application will be remanded to the examiner. . . .

(2) Request that the application be reheard under § 1.197(b) by the Board of Patent Appeals and Interferences upon the same record. . . .

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

*AFFIRMED - 37 CFR § 1.196(b)*

EDWARD C. KIMLIN	)	
Administrative Patent Judge	)	
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	)	
	)	BOARD OF PATENT
CHUNG K. PAK	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
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ROMULO H. DELMENDO	)	
Administrative Patent Judge	)	

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