

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte MASARU ICHIKAWA  
and  
RYUICHIROU OHNISHI

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Appeal No. 1999-1180  
Application No. 08/751,557

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HEARD: November 27, 2001

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Before KIMLIN, OWENS, 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 and 3 through 8, which are all of the claims pending in the above-identified application.

The subject matter on appeal relates to a method for preparing difluoromethane by reacting hydrogen with dichlorodifluoromethane and/or monochlorodifluoromethane in the presence of a palladium-based catalyst including Pd and at least one additional metal selected from the group consisting of vanadium, zirconium, calcium, magnesium, niobium, and tantalum. (Appeal brief, page 3.) Further details of this appealed subject matter are recited in illustrative claims 1 and 6 reproduced below:

1. A method for preparing difluoromethane comprising reacting dichlorodifluoromethane and/or monochlorodifluoromethane with hydrogen in the presence of a palladium-based catalyst, wherein the palladium-based catalyst is a catalyst in which at least one additional metal selected from the group consisting of vanadium, zirconium, calcium, magnesium, niobium and tantalum is added to palladium.

6. The method according to claim 1, wherein the molar ratio of hydrogen to the dichlorodifluoromethane and/or monochlorodifluoromethane is from 1 to 10.

The examiner relies on the following prior art references as evidence of unpatentability:

Morikawa et al. (Morikawa) (published JP patent application)	1-242536	Sep. 27, 1989
Moore et al. (Moore) (published EP patent application)	0,508,660 A1	Oct. 14, 1992

Claims 1 and 3 through 8 on appeal stand rejected under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Moore and Morikawa.<sup>1</sup> (Examiner's answer, pages 3-4.)

On consideration of the record, it is our judgment that the aforementioned rejection is well founded. Accordingly, we affirm for the reasons well stated in the examiner's answer. Nevertheless, we add the following comments primarily for emphasis.<sup>2</sup>

Moore describes a method for the production of difluoromethane comprising reacting a compound of formula  $XYCF_2$ , wherein X and Y are each H, Cl, or Br but at least one of X and Y is an atom other than hydrogen, with hydrogen at elevated temperature in the presence of a hydrogenation catalyst. (Page 2, lines 12-15.) According to Moore, the compound of formula  $XYCF_2$  is "[u]sually" a chlorinated difluoromethane, preferably chlorodifluoromethane. (Page 2, lines 21-22.) Also, Moore

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<sup>1</sup> Our citations to Morikawa are to the full English language translation, a copy of which is attached to this decision.

<sup>2</sup> The appellants submit that the appealed claims should be considered separately in two groups, namely group I (claims 1, 3-5, and 7) and group II (claims 6 and 8). Therefore, pursuant to 37 CFR § 1.192(c)(7) (1997), we select claims 1 and 6 from the two groups of claims, respectively, and decide this appeal as to the examiner's ground of rejection on the basis of these claims only.

teaches that the hydrogenation catalyst is preferably a catalyst based on palladium and that the catalyst may further contain an additional metal, preferably a metal that is more active than palladium (e.g., nickel). (Page 2, lines 36-39 and 40-56; examples 20-21.) Moore, however, does not specifically describe the use of a catalyst based on palladium and at least one additional metal selected from the group consisting of vanadium, zirconium, calcium, magnesium, niobium, and tantalum as recited in appealed claim 1.

Like Moore, Morikawa's disclosure also relates to a method for forming a particular fluoroalkane by reacting hydrogen with a particular haloalkane starting material in the presence of a hydrogenation catalyst. Specifically, Morikawa describes a method for preparing tetrafluoroethane represented by  $\text{CF}_3\text{CH}_2\text{F}$  or  $\text{CHF}_2\text{CHF}_2$  by reacting a haloethane represented by  $\text{CF}_2\text{XCFYZ}$  (X is F or Cl; when X is F, Y and Z are Cl, F, or H; when one of Y or Z is F, the other Y or Z is H or Cl; when X is Cl, one of Y or Z is F and the other one of Y or Z is H or Cl) with hydrogen in the presence of a hydrogenation catalyst, which is formed by adding at least one element (or compound thereof) selected from the group consisting of Zr, Hf, Ti, Ni, and Ta to a platinum group element (e.g., palladium). (E.g., page 2, claim 1; page

3, line 6.) According to Morikawa, palladium is an excellent hydrogenation catalyst, but it is susceptible to chemical change (e.g., it is soluble in hydrochloric acid in the presence of oxygen) and can sinter easily because it has a lower melting point relative to other platinum group metals. (Page 4, lines 4-15.) Consequently, the life of a palladium catalyst is said to be "not necessarily long." (Id.) Morikawa further teaches: "Elements or chemical compounds in which the surface hydrogen atom concentration is high are considered to be suitable addition constituents from the viewpoint of obtaining hydrogen reduction characteristics." (Sentence bridging pages 4-5.) In addition, Morikawa discloses:

[F]rom the viewpoint of hydrochloric acid resistance, it is desirable to add titanium, zirconium, hafnium, niobium, or tantalum, which are selected from the elements which have high affinity with hydrogen. Amount of this addition is 50-0.01% by weight relative to the main constituent, or, preferably 30-0.1% by weight.

(Page 5, lines 16-20; Preparation Examples 1-8; Application Example 1; and Comparison Example 1.)

Based on these prior art teachings, we determine that the examiner has presented substantial evidence to support a prima facie case of obviousness within the meaning of 35 U.S.C. § 103.

Thus, we find ourselves in complete agreement with the examiner's analysis. (Examiner's answer, pages 3-4.) From our perspective, one of ordinary skill in the art would have been led to use Morikawa's hydrogenation catalyst based on (i) palladium and (ii) zirconium, niobium, or tantalum to carry out Moore's process, thus arriving at a method encompassed by appealed claim 1, in order to improve the life and performance of the hydrogenation catalyst. As required under 35 U.S.C. § 103, the reasonable expectation of success comes from the collective teachings of the prior art and not the appellants' own disclosure. Here, Moore would have suggested to one of ordinary skill in the art that any hydrogenation catalyst may be used for the disclosed hydrogenation reaction, and Morikawa would have motivated one of ordinary skill in the art to use a hydrogenation catalyst within the scope of appealed claim 1 to obtain advantages in terms of catalyst life and performance. As stated by the examiner (examiner's answer, page 5), the hydrogenation reaction described in Morikawa is so similar to the hydrogenation reaction described in Moore that one of ordinary skill in the art would have prima facie expected Morikawa's catalyst to provide the same or substantially the same results when used in Moore's process.

Once a prima facie case of obviousness is established, the burden of proof then shifts to the appellants to rebut the prima facie case by persuasive argument or evidence (e.g., unexpected results). In re Mayne, 104 F.3d 1339, 1343, 41 USPQ2d 1451, 1455 (Fed. Cir. 1997) ("With a factual foundation for its prima facie case of obviousness shown, the burden shifts to applicants to demonstrate that their claimed fusion proteins possess an unexpected property over the prior art.").

Referring to Preparation Examples 1-8 and Comparison Example 1 of Morikawa, the appellants argue that one of ordinary skill in the art would have found no motivation to combine the teachings of Moore with Morikawa. (Appeal brief, pages 6-7; 11-12.) Specifically, the appellants' position is that a catalyst including Pd/Ta, Pd/Nb, Pd/Ti, Pd/Zr, Pd/Hf, Pt/Zr, or Rh/Zr provided substantially the same conversion and selectivity as compared to a catalyst including only Pd, and thus one of ordinary skill in the art would not have been led to use Morikawa's catalyst in Moore's process. (Appeal brief, pages 6-7.) We cannot agree.

As admitted by the appellants (id. at page 12), Morikawa teaches that a catalyst based on both Pd and another metal such

as Ta, Nb, or Zr has increased durability. In addition, Morikawa suggests that these catalysts would be more resistive to hydrochloric acid, as we discussed above. Thus, contrary to the appellants' argument, Morikawa provides the requisite motivation or suggestion for one of ordinary skill in the art to modify Moore's process by using Morikawa's catalyst for the purpose of improving catalyst durability and resistance to hydrochloric acid. On this point, we point out that the motivation to arrive at a claimed invention as provided in the prior art does not have to be the same as that of the appellants. In re Kemps, 97 F.3d 1427, 1430, 40 USPQ2d 1309, 1311 (Fed. Cir. 1996).

The appellants contend that neither Morikawa nor Moore discloses the molar ratio ("from 1 to 10") of hydrogen to dichlorodifluoromethane and/or monochlorodifluoromethane recited in appealed claim 6. (Appeal brief, pages 7 and 8.) This is incorrect. (Moore's page 3, lines 29-32; paragraph bridging Morikawa's pages 6-7.)

Referring to Moore's Examples 12 and 13 (catalyst containing only Pd) and Examples 20 and 21 (catalyst containing Pd and Ni), the appellants urge that the use of palladium

together with nickel instead of palladium only leads to a decrease in selectivity as well as conversion rate. (Appeal brief, page 9.) We note, however, that the examiner's prima facie case of obviousness does not rest on whether one of ordinary skill in the art would have been led to use nickel together with palladium. Rather, the examiner's position is based on the collective teachings of Moore and Morikawa, which would have suggested to one of ordinary skill in the art that the use of Morikawa's catalyst in Moore would have resulted in improved catalyst life and hydrochloric acid resistance. In any event, Moore's examples showing the use of a catalyst containing both Pd and Ni cannot reasonably be extrapolated to other catalysts within Moore's disclosure, i.e. catalysts that contain Pd and another metal that is a more active hydrogenation catalyst. Moore teaches that the use an additional metal which is a more active hydrogenation catalyst than Pd "acts to purify the product stream by hydrogenation of the toxic impurity, chlorofluoromethane, to methane." (Page 2, lines 46-48.) As we discussed above, the motivation to combine the references need not be the same as that of the appellants. Kemps, 97 F.3d at 1430, 40 USPQ2d at 1311.

The appellants allege that a comparison of Examples 13 and 14 of the present specification with Moore's examples reveals that the invention recited in appealed claim 1 provides "markedly improved" selectivities. (Appeal brief, pages 9-10.) We are not persuaded by this analysis. As pointed out by the appellants themselves (id. at page 10), the conditions (e.g., the amounts and flow rates of the catalysts) used in Moore's examples differ significantly from those of the examples described in the present specification. Hence, the examples of Moore are not reasonably comparable to the examples of the present specification for the purpose of determining whether the incorporation of an additional metal as recited in the appealed claims imparts unexpected results. In re Dunn, 349 F.2d 433, 439, 146 USPQ 479, 483 (CCPA 1965) ("While we do not intend to slight the alleged improvements, we do not feel it an unreasonable burden on appellants to require comparative examples relied on for non-obviousness to be truly comparative. The cause and effect sought to be proven is lost here in the welter of unfixed variables.").

The appellants also argue that Examples 13 through 15 of the present specification provide evidence of "improved

conversion rate." (Appeal brief, pages 10-11.) Specifically, it is said that Examples 13 and 14, which describes a catalyst containing Pd and V, should be compared against Example 15, which describes a catalyst containing only Pd. We observe, however, that the results disclosed for Examples 13 and 14 are comparable, if not inferior, to the results disclosed for Moore's catalyst. (Moore's Example 12.) Moreover, Examples 13 and 14 of the present specification are limited to a Pd/V catalyst used under specific reaction conditions. By contrast, appealed claims 1 and 6 are significantly broader. Thus, we determine that the appellants' showing of unexpected results is far from being commensurate in scope with the degree of patent protection sought. In re Kulling, 897 F.2d 1147, 1149, 14 USPQ2d 1056, 1058 (Fed. Cir. 1990) ("[O]bjective evidence of nonobviousness must be commensurate in scope with the claims."); (quoting Lindner, 457 F.2d at 508, 173 USPQ at 358); In re Dill, 604 F.2d 1356, 1361, 202 USPQ 805, 808 (CCPA 1979) ("The evidence presented to rebut a prima facie case of obviousness must be commensurate in scope with the claims to which it pertains.").

The appellants urge that Moore's Examples 23 and 24 should be compared against Examples 1 and 4 of the present

specification. (Appeal brief, page 11.) Again, however, these examples cannot be fairly compared for the purpose of establishing nonobviousness because Moore's experiments are conducted under conditions which are significantly different from Examples 1 and 4 of the present specification.

The appellants contend that Morikawa describes "a method for producing different haloethane products by using different haloethane starting materials and a different palladium-type catalyst in contrast to the method" described in Moore. However, both Moore and Morikawa relate to the hydrogenation of chlorinated fluoroalkanes to form fluoroalkanes as in the present invention. Furthermore, one of ordinary skill in the art would have had a reasonable expectation that the improvements in terms of catalyst life and hydrochloric acid resistance as described in Morikawa would also be obtainable in Moore by using Morikawa's catalyst.

For these reasons and those set forth in the answer, we affirm the examiner's rejection under 35 U.S.C. § 103(a) of all the appealed claims as unpatentable over the combined teachings of Moore and Morikawa.

The decision of the examiner is affirmed.

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

AFFIRMED

EDWARD C. KIMLIN	)	
Administrative Patent Judge	)	
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	)	
	)	BOARD OF PATENT
TERRY J. OWENS	)	
Administrative Patent Judge	)	APPEALS AND
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ROMULO H. DELMENDO	)	
Administrative Patent Judge	)	

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