

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 7 December 2022**

Case Number: T 0476/21 - 3.3.05

Application Number: 16764540.7

Publication Number: 3168332

IPC: C25D5/56, C01B21/38, C25D17/06,
C25F5/00, C23C18/16, C23C18/30

Language of the proceedings: EN

Title of invention:

USE OF A JIG ELECTROLYTIC STRIPPER FOR REMOVING PALLADIUM FROM
AN OBJECT AND A METHOD FOR REMOVING PALLADIUM

Patent Proprietor:

Okuno Chemical Industries Co., Ltd.

Opponents:

Atotech Deutschland GmbH & Co. KG
MacDermid, Incorporated

Headword:

jig electrolytic stripper/Okuno

Relevant legal provisions:

EPC Art. 123(2), 123(3), 83, 84, 54, 56
RPBA 2020 Art. 12(4)

Keyword:

Amendments - added subject-matter (no) - broadening of claim
(no)

Claims - clarity (yes)

Sufficiency of disclosure - (yes)

Novelty - (yes)

Inventive step - main request (no) - auxiliary request (yes)

Auxiliary request - admissibly filed and maintained

Decisions cited:

G 0001/03, G 0003/14, G 0002/88, T 0796/91, T 2001/12,

T 0210/05, T 0261/19

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 0476/21 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 7 December 2022

Appellant: Atotech Deutschland GmbH & Co. KG
(Opponent 1) Erasmusstraße 20
10553 Berlin (DE)

Representative: Atotech Deutschland GmbH & Co. KG
Intellectual Property
Erasmusstraße 20
10553 Berlin (DE)

Respondent: Okuno Chemical Industries Co., Ltd.
(Patent Proprietor) 4-7-10, Doshomachi,
Chuo-ku,
Osaka-shi, Osaka 5410045 (JP)

Representative: Müller-Boré & Partner
Patentanwälte PartG mbB
Friedenheimer Brücke 21
80639 München (DE)

Party as of right: MacDermid, Incorporated
(Opponent 2) 245 Freight Street
Waterbury CT 06702 (US)

Representative: Jenkins, Peter David
Page White & Farrer Limited
Bedford House
21A John Street
London WC1N 2BF (GB)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
1 March 2021 concerning maintenance of the
European Patent No. 3168332 in amended form.**

Composition of the Board:

Chairman P. Guntz
Members: S. Besselmann
 J. Roider

Summary of Facts and Submissions

- I. This appeal is against the opposition division's interlocutory decision that European patent EP 3 168 332 B1 in the form of the then pending auxiliary request 4 met the requirements of the EPC. The patent in suit concerns a use of a jig electrolytic stripper for removing palladium from an object and a method for removing palladium.
- II. Opponent 1 (appellant) appealed this decision.
- III. The patent proprietor (respondent) defended the claims upheld by the opposition division as the main request and filed auxiliary requests 1-5 with the reply to the statement of grounds of appeal.
- IV. Opponent 2 (party as of right) did not make any submissions as to the substance of the appeal.
- V. Oral proceedings were held on 7 December 2022 by videoconference (Article 15(a)(1) RPBA 2020). Opponent 2 was not represented, as announced by letter of 10 August 2022.
- VI. During the oral proceedings, the respondent supplemented auxiliary request 1 with an adapted description.
- VII. The following documents are of relevance here:
D2 US 2007/0254479 A1
D3 EP 2 514 855 A1
D4 DE 2 146 828 B
D6 US 4,264,420 A

D7 DE 23 63 352 A1
D8 US 4,233,124 A
D9 WO 82/04072 A1
D10 EP 0 913 502 A1
D11 A.J. Bard, Encyclopedia of Electrochemistry
of the Elements, vol. VI, chapter 4, pp.
261-4, 1976
D26 US 2005/0109734 A1

VIII. Independent claims 1 and 4 of the main request relate to a use and a method, respectively, and read as follows.

Claim 1: *"Use of a jig electrolytic stripper for removing palladium from an object to be treated on which palladium is adhered, the jig electrolytic stripper comprising the following components (A) to (C):*

*(A) at least one member selected from the group consisting of nitric acid and salts thereof,
(B) at least one member selected from the group consisting of ammonia, ammonium salts, ethylene amine compounds, alkyl diamine compounds, and amino acids, and
(C) a bromide,
wherein the jig electrolytic stripper has a pH of 6 or more and 12 or less."*

Claim 4: *"A method for removing palladium, the method comprising contacting a jig electrolytic stripper comprising the following components (A) to (C) with an object to be treated on which palladium is adhered:
(A) at least one member selected from the group consisting of nitric acid and salts thereof,
(B) at least one member selected from the group consisting of ammonia, ammonium salts, ethylene amine*

*compounds, alkyl diamine compounds, and amino acids,
and*

(C) a bromide,

*wherein the jig electrolytic stripper has a pH of 6 or
more and 12 or less."*

Method claims 8 and 9 read as follows:

Claim 8: *"A method for reducing the concentration of
palladium accumulated in an acidic etching solution
containing chromium trioxide, the method comprising
performing the method for removing palladium according
to any one of claims 4 to 7."*

Claim 9: *"A method for reducing the concentration of
palladium accumulated in an acidic etching solution
containing manganese, the method comprising performing
the method for removing palladium according to any one
of claims 4 to 7."*

IX. In auxiliary request 1, the pH range of the stripper is more narrowly defined, and the respective feature in claims 1 and 4 reads:

*"wherein the jig electrolytic stripper has a pH of 8 or
more and 10 or less."*

Claims 8 and 9 are the same as in the main request. Dependent claims 2, 3 and 5-7 relate to particular embodiments.

X. The appellant's arguments relevant to the present decision can be summarised as follows.

Main request

The requirements of Article 123(2) EPC were not met because the application as originally filed did not disclose any use and because the lower and upper limits of the pH had been selected from two lists.

The scope of protection had been extended because the category of claim 1 had been changed.

The amendments resulted in lack of clarity because the pH could not be 6 and 12 at the same time and because it was not clear how this pH could be obtained using components (A) to (C). The amendments furthermore had the consequence that the respective claim categories and thus the scope of protection could not be clearly determined.

The invention was insufficiently disclosed because the claims were so broad that they encompassed non-working embodiments. The examples were only for very few of the claimed components. The required pH could not be obtained using nitric acid, which was strongly acidic. The methods stipulated in claims 8 and 9 could not be carried out because an acidic etching solution could not be used in the same process step, i.e. at the same time, as a jig electrolytic stripper with a pH of 8-10.

The subject-matter of claims 1 and 4 lacked novelty in view of the examples shown in Table 2 of D3 seen in conjunction with paragraph [0033] listing palladium as a possible constituent of the ruthenium alloy.

The subject-matter of claims 1 and 4 lacked an inventive step in view of the indicated disclosure in D3. There was no doubt that the etching solution known from D3 could remove a ruthenium alloy containing palladium, in line with paragraph [0013].

The subject-matter of claims 1 and 4 also lacked an inventive step on the basis of each of D4, D6, D7, D8, D9, D2 and D26 as the starting point.

Documents D4, D6, D7 and D8 did not explicitly mention removing palladium. However, the skilled person reading these documents would be aware that electroless and electrolytic metal plating methods involved an activation step using a palladium catalyst. It was thus obvious that removing metal from a plating jig/rack included removing palladium.

D9 related to the same purpose of stripping palladium from jigs (racks). D9 did not disclose the presence of a bromide or a pH of 6-12. The pH of 6-12 was arbitrary. Adding bromide allowed better removal of palladium. However, this would have been obvious from D8 or D11, and combining D9 with the teachings of D8 or D11 would have led the skilled person to the claimed use and method.

D2 disclosed a process involving selective etching of the metal alloy layer. The metal alloy layer could contain palladium (paragraph [0040]). D2 did not specify the pH, but it would have been obvious for the skilled person to vary the pH.

D26 disclosed etching solutions for removing palladium. Example 8 disclosed a solution comprising nitric acid and ammonium chloride. It did not disclose bromide or the pH range, but these features provided no technical effect. It would have been obvious to use an alternative halide such as bromide instead of chloride and to vary the pH range.

Auxiliary request 1

Auxiliary request 1 should not be admitted into the proceedings because it had only been filed during the oral proceedings before the opposition division.

The requirements of Article 123(2) EPC were not met because the lower and upper limits of the pH had been arbitrarily selected from two lists.

The objections raised against the main request also applied to auxiliary request 1. Limiting the range of the pH to 8-10 was arbitrary and thus did not support inventive step.

Starting from D3, it would have been obvious to adjust the pH to 8-10. D3 disclosed a pH of 10-12, overlapping with the claimed range.

Starting from D8, the skilled person would not only have considered palladium as a metal to be removed from plating jigs, as indicated, but they would also have selected a pH in the range of 8-10 because this was close to the range of 5.5 to 7.5, which D8 taught to be preferred. Similar arguments applied to D6 and D4.

- XI. The respondent's arguments relevant to the present decision can be summarised as follows.

Main request

Document D3 did not take away novelty of the claims. D3 related to removing ruthenium. Palladium was not present in the examples shown in D3, and there was no evidence in D3 that palladium could be etched in the

presence of ruthenium. Furthermore, the etching composition used in Table 2 did not include an ammonium salt, ammonium being NH_4^+ .

D3 did not render obvious the subject-matter claimed. It was not relevant prior art for assessing inventive step because it did not mention removing palladium. D3 only concerned removing ruthenium. While ruthenium could contain a limited proportion of alloying metals, there was no disclosure that these could be removed using the composition of Table 2. For instance, silicon was a possible alloy component, but it could not be removed.

The closest prior art was D9, which related to the same purpose of removing palladium.

Auxiliary request 1

Auxiliary request 1 was not late filed. It was identical to auxiliary request 7 filed before the opposition division within the time limit set under Rule 116(2) EPC and had only been renumbered as auxiliary request 5 during the oral proceedings before the opposition division.

The claims were limited to the pH range in which palladium could be effectively removed and sludge generation could be avoided. Comparing the teachings of the patent in suit and D3 showed that palladium could be effectively removed at pH 8, while ruthenium could not be removed (Comparative Example 1 of D3). The ruthenium removal rate was highest near a pH of 11 (D3, Table 2, [paragraph [0052]]). The examples in Table 20 of the patent in suit showed that a pH of 8-10 was beneficial for avoiding sludge formation.

The technical problem was thus to be seen in effectively removing palladium while avoiding the generation of sludge. The skilled person would not have arrived in an obvious manner at the proposed solution.

- XII. The appellant (opponent 1) requested that the decision under appeal be set aside and that the European patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed and, alternatively, that the patent be maintained on the basis of one of auxiliary requests 1-5 filed with the reply to the appeal, auxiliary request 1 having been supplemented with the amended description filed during the oral proceedings before the board.

Reasons for the Decision

Main request

1. Article 123(2) EPC
- 1.1 Claim 1 is a use claim. According to the appellant, there was no disclosure in the application as originally filed of a *use of a jig electrolytic stripper for removing palladium from an object to be treated on which palladium is adhered*, i.e. any arbitrary object. The disclosed *method* could not form a suitable basis for the claimed *use* because the method involved, as an essential feature, a contacting step (paragraph [0044] of the application as originally filed).

1.2 There is no express reference to a use of a jig electrolytic stripper in the application as originally filed. However, the implicit use of a jig electrolytic stripper is electrolytic stripping of a jig. In this case, the jig electrolytic stripper is disclosed to be used more generally for removing palladium from an object to be treated on which palladium is adhered. Namely, claim 4 as originally filed specifies a method for removing palladium comprising contacting the jig electrolytic stripper with an object to be treated on which palladium is adhered; it is similar to the method disclosed in the description of the application as originally filed (paragraph [0044]). It is implicit in this disclosure that the intended effect of removing palladium is obtained by using the indicated jig electrolytic stripper, which furthermore implies contacting, so that the use of a jig electrolytic stripper for removing palladium from an object to be treated on which palladium is adhered is directly and unambiguously derivable from the application as originally filed.

1.3 Claims 1 and 4 furthermore specify that the jig electrolytic stripper has a pH of 6 or more and 12 or less. Values of the pH are disclosed in the application as originally filed in paragraphs [0043] and [0049]. The disclosure of preferred lower and preferred upper limits of the pH value amounts to the disclosure of preferred ranges, defined by the lower and upper limits. The range defined by one of the preferred lower limits in conjunction with one of the preferred upper limits is likewise disclosed.

This view is in line with established case law that in the case of disclosure of both a general and a

preferred range, a combination of the preferred disclosed narrower range and one of the part-ranges lying within the disclosed overall range on either side of the narrower range is unequivocally derivable from it (Case Law of the Boards of Appeal of the EPO, 10th edn., 2022, II.E.1.5.1).

Furthermore, the indicated disclosure of pH values is not expressly limited to aqueous solutions. There is no mention of the solvent being water in paragraph [0043]. Using water is mentioned in the preceding paragraph [0042] but merely as a preferred embodiment. There was consequently no need to insert an express limitation to aqueous solutions in the claims. Whether the mention of a pH value in general might be understood as implicitly relating to an aqueous solution is irrelevant because this understanding would also apply to the claim.

1.4 The requirements of Article 123(2) EPC are therefore met.

2. Article 123(3) EPC

2.1 The category of claim 1, being a use claim, was not changed in comparison to granted claim 1. The argument that the scope of protection was extended due to a change of category is therefore not convincing.

Furthermore, claim 1 cannot be understood as defining a process for producing a product so that the provisions of Article 64(2) EPC do not apply.

There was therefore no extension of the scope of protection in comparison to the patent as granted.

3. Clarity (Article 84 EPC)

3.1 In opposition proceedings, compliance with the requirements of Article 84 EPC may only be examined to the extent that an amendment introduces non-compliance with Article 84 EPC (see G 3/14 (OJ 2015, 102), catchword).

3.2 The wording "*has a pH of 6 or more and 12 or less*" defines the lower and upper limits of a range; it cannot be understood to mean that the pH is at the same time 6 and 12.

Adding a substance to adjust the pH where necessary is not excluded in view of the open wording of the claim ("comprising"), so there is no inconsistency between the components specified in the claim and the specified pH. Adjusting the pH is also disclosed in paragraph [0061] of the patent.

3.3 The appellant also argued that the amendment by which the object to be treated was specified in claim 1 led to lack of clarity. This amendment aligned the wording of claim 1 further with that of method claim 4. According to the appellant, use claim 1 and method claim 4 thus effectively defined the same subject-matter, and the difference in scope, or their respective scopes, could not be established.

3.4 The board does not agree for the following reasons.

3.4.1 Claim 1 relates to the use of a jig electrolytic stripper for removing palladium from an object to be treated on which palladium is adhered, while claim 4 relates to a method for removing palladium, the method

comprising contacting a jig electrolytic stripper with an object to be treated on which palladium is adhered.

- 3.4.2 A distinction generally is to be made between use claims, which define the use of a particular physical entity to achieve an "effect", and claims which define such a use to produce a "product". Thus, provided that a use claim defines the use of a physical entity to achieve an "effect" and does not define a use to produce a "product", the use claim is not a process claim within the meaning of Article 64(2) EPC (G 2/88 (OJ 1990, 93) Reasons 5.1).

In this case, use claim 1 as granted related to achieving an effect, namely the removal of palladium. This interpretation has not been changed by use claim 1 at issue additionally specifying "from an object to be treated on which palladium is adhered" and is independent of the observation that implementing the use according to claim 1 at issue involves carrying out the method step of claim 4 at issue. Furthermore, since the patent as granted already contained a use claim (claim 1) and a method claim (claim 4), any possible clarity issue linked to the presence of these claim categories in combination was already present in the patent as granted and is not open to examination in the current opposition appeal proceedings.

- 3.4.3 The board sees no other reason why the amendment in claim 1 specifying the object to be treated would lead to lack of clarity. There is no basis to construe claim 1 as relating to the jig electrolytic stripper as such or to the object to be treated as such.

In T 796/91, cited by the appellant, clarity was found to be lacking because a claim contained a heterogeneous

combination of process and application features (Reasons 12). Namely, a claim relating to a process for producing a product was amended by further specifying using the product. The structure of the claim dealt with in T 796/91 is thus not comparable to claim 1 at issue.

3.5 The objections of lack of clarity are therefore not convincing.

4. Sufficiency of disclosure (Article 83 EPC)

4.1 The appellant argued that the skilled person was unable to carry out the claimed invention across the whole area claimed. In their opinion, the claims were too broad and thus encompassed non-working embodiments, considering, for instance, that they were not limited to electrolytic stripping, that the composition was not limited to aqueous solutions and not even to solutions but could even be a powder, and that the pH range included values leading to corrosion of the tips of the jig or the precipitation of hydroxides. According to the appellant, using nitric acid as component (A) did not allow removing palladium, nor did it lead to the specified pH. The appellant also held that the patent in suit did not support using components (B) and (C) other than those used in the examples.

4.2 It is established case law that a successful objection of lack of sufficiency of disclosure presupposes that there are serious doubts, substantiated by verifiable facts; in opposition proceedings, the burden of proof is initially on the opponent (Case Law of the Boards of Appeal of the EPO, 10th edn., 2022, II.C.9).

4.3 The appellant did not provide any evidence in support of their objection that the claims were so broad that they encompassed non-working embodiments. Furthermore, the claims need to be construed in view of the specified intended purpose of removing palladium and thus do not include embodiments which the skilled person would consider unreasonable from a technical point of view, such as the mere contacting of a powder mixture with the object to be treated.

There is no reason why the skilled person would be unable to provide the jig electrolytic stripper specified in the claim, comprising components (A) to (C) and having a pH of 6 or more and 12 or less. As indicated, it is within the scope of the claimed invention to adjust the pH if necessary (see point 3.2). This is common general knowledge and also mentioned in the patent in suit (paragraph [0061]).

The observation that only some of the possible components (A) to (C) specified in the claim were used in the examples of the patent in suit does not prove that the other compounds specified in the claim would not be suitable as components of the jig electrolytic stripper. No evidence was provided that a composition based on these other components would not be effective for removing palladium.

While it is necessary that palladium can be removed using the jig electrolytic stripper, this being a functional feature of the claims, the claimed invention implies neither removing palladium completely nor preventing corrosion or hydroxide formation.

4.4 As regards claims 1 and 4, the objection of lack of sufficiency of disclosure is thus not convincing.

4.5 Regarding claims 2-3 and 5-7, the appellant argued that these dependent claims did not include all the features of the examples relating to the corresponding embodiments. However, there is no reason why the skilled person would be unable to implement the additional features specified in dependent claims 2-3 and 5-7. There is no reason why electrolytic stripping of palladium would only be possible if a "copper sulfate plating film" or "bright nickel" was additionally present. Whether any desired effects not expressed in the claims under consideration are obtained is irrelevant to sufficiency of disclosure (see G 1/03 (OJ 2004, 413), Reasons 2.5.2; see also T 2001/12, Reasons 3.4).

4.6 Claims 8 and 9 relate to methods for reducing the concentration of palladium accumulated in an acidic etching solution. However, the method step expressly specified is the one according to any of claims 4-7 for removing palladium, i.e. removing palladium from an object to be treated. The specified purpose of claims 8 and 9 is thus not identical to the one associated with the method step performed. However, this possible inconsistency concerns the clarity of the claims. In this case, it does not result in lack of sufficiency of disclosure.

It is implicit in claims 8 and 9 that the method of claim 4 is carried out on an object to be treated to remove palladium and that this object is subsequently contacted with an etching solution. There is no basis for viewing the jig electrolytic stripper as the acidic etching solution. There is thus no inconsistency between the pH of the etching solution being acidic and the pH of the jig electrolytic stripper being 6-12.

The appellant contested that it could be derived from the patent in suit that the method of claim 8 (or 9) was carried out subsequently to the method of claim 4.

However, this is not only implicit in the claims, as indicated, but can also be derived from the patent in suit. Namely, the patent as a whole (paragraphs [0002], [0005] and [0059] and Table 18) provides a detailed description of a method of reducing palladium accumulation in an etching solution. In light of this teaching, also considering that sufficiency of disclosure is to be assessed on the basis of the application as a whole (Case Law of the Boards of Appeal of the EPO, 10th edn., 2022, II.C.3.1), there is no reason why the skilled person would be unable to carry out the claimed methods.

4.7 Moreover, the reference in claim 8 to an acidic solution containing "chromium trioxide" includes a chromic acid solution (chromium trioxide being the anhydride of chromic acid). Similarly, the reference to an acidic solution containing "manganese" in claim 9 would be understood as including compounds of manganese, such as permanganic acid.

4.8 The objections of lack of sufficiency of disclosure are therefore not convincing.

5. Novelty

5.1 According to the appellant, the subject-matter of claims 1 and 4 lacked novelty in view of the examples shown in Table 2 of D3, seen in conjunction with

paragraph [0033] listing palladium as a possible constituent in the ruthenium alloy.

5.2 Table 2 of D3 shows various etching compositions comprising hydrogen bromide, nitric acid and tetramethyl ammonium hydroxide (TMAH), corresponding respectively to components (C), (A) and (B) of claims 1 and 4 under consideration. There is no reason why TMAH would not be an ammonium salt within the meaning of the claims at issue. The term "ammonium salts" is to be understood in its general, broad meaning, which is not restricted to salts of NH_4^+ but includes e.g. quaternary ammonium salts. Organic substituents not being excluded is furthermore supported by the explicit reference to ethylene amine compounds and alkyl diamine compounds as alternative components (B).

5.3 However, the examples in Table 2 of D3 do not relate to removing palladium (but ruthenium or a ruthenium/tantalum alloy). An example constitutes a specific embodiment that cannot be freely combined with other information selected within the description (T 210/05, Reasons 2.3). The considerations of that decision can be transferred to this case in which it is necessary to select not only a specific etching composition within the general disclosure of D3 involving the bromine-containing compound, the oxidising agent and the basic compound, but additionally to select palladium from a long list of other metals that may be present in the ruthenium alloy (paragraph [0033] of D3), even if this list is interpreted as a list of alloy components which are also removed.

While relevant etching compositions are exemplified (Table 2), other examples (Table 1) relate to other compositions which do not contain any component that

would correspond to component (A) specified in claims 1 and 4 at issue. There is consequently no direct and unambiguous disclosure of using one of the etching compositions according to Table 2 specifically for etching a palladium-containing ruthenium alloy.

5.4 The subject-matter of claims 1 and 4 is therefore novel in view of D3.

6. Inventive step

6.1 The patent in suit relates to using a jig electrolytic stripper for removing palladium (paragraph [0001]). This involves removing palladium from an object to be treated on which palladium is adhered (claims 1 and 4). Despite the reference to a jig *electrolytic* stripper, the palladium may be removed by a mere contacting step (claim 4).

6.2 Document D3 relates to etching of ruthenium-based metal (paragraph [0001]). It aims in particular at removing ruthenium from the back sides and edges of a substrate such as a silicon wafer on which a ruthenium film has been formed (paragraphs [0003] and [0004]).

6.3 D3 thus also relates to removing plated platinum group metal from an object on which the metal is adhered. This general purpose is similar to the one of the patent in suit.

It is not necessary that the technical problem addressed in the prior art be identical to the subjective technical problem indicated in the patent in suit.

D3, more particularly Table 2 of D3, consequently constitutes a suitable starting point for addressing inventive step.

Moreover, where inventive step is denied in view of a piece of prior art, the choice of that prior art as the starting point for the assessment of inventive step needs no specific justification as the claimed invention must, as a rule, be non-obvious over any prior art (T 261/19, Reasons 2.5).

- 6.4 The patent in suit more specifically addresses the subjective technical problem of sufficiently removing palladium adhered to the current-conducting portion and the insulating-material-coated portion of the plating jig, with reduced erosion of the metal of the current-conducting portion of the plating jig (paragraphs [0008] and [0010]).
- 6.5 It is established case law that the subjective technical problem as originally presented by the applicant might require reformulation on the basis of objectively more relevant elements originally not taken into account by the applicant or patentee (Case Law of the Boards of Appeal of the EPO, 10th edn., 2022, I.D. 4).

This applies to this case in which the prior art under consideration, i.e. D3, constitutes an entirely different starting point than the one described in the patent in suit. The patent in suit started from known palladium stripping methods involving different stripping compositions which cannot sufficiently remove palladium (paragraphs [0003] and [0004] of the patent in suit). Starting from the known stripping composition of D3 (see the considerations regarding novelty,

point 5.2) thus involves another perspective, and the objective technical problem needs to be reformulated accordingly.

6.6 The objective technical problem should be based on the technical effect of exactly the features distinguishing the claim from the prior art and be as specific as possible without containing elements or pointers to the solution (Case Law of the Boards of Appeal of the EPO, 10th edn., 2022, I.D.4.2.1).

6.7 While the claimed invention involves removing another metal, namely palladium, there is no indication of another technical effect such as a specific adaptation to, or improved suitability for, palladium in comparison with ruthenium.

6.8 In light of the above, and starting from Table 2 of D3, the objective technical problem may be seen in extending the domain of application.

6.9 The skilled person faced with this technical problem would find alternative metal alloys which may be etched in paragraph [0033] of D3. This paragraph lists palladium among the possible alloy components of the ruthenium alloy. The skilled person would thus readily understand that a ruthenium alloy containing palladium may alternatively be etched.

6.10 It is clear from D3 as a whole, and paragraph [0013] in particular, that what is to be etched, i.e. removed, is the film of the ruthenium alloy including the other metal(s); not merely the ruthenium component of the alloy film. The teaching that the amount of other metals in the ruthenium alloy must not exceed 30 at% for a practical etching rate (paragraph [0033])

supports this understanding. This understanding does not change owing to the observation that silicon is also in the list of possible alloy components (paragraph [0033]), while it is taught that the silicon-based substrate, such as a silicon wafer (examples), must not be damaged (paragraphs [0013]).

- 6.11 Claims 1 and 4 specify neither in which form palladium is adhered to the object to be treated nor that only palladium be removed. The claims are to be understood broadly and thus encompass embodiments in which palladium is present in the form of a constituent of an alloy adhered to an object and in which removing the alloy thus involves removing palladium. This understanding is supported by the patent in suit, according to which the activation and plating processes involve using other metals in addition to palladium (see Tables 1-6) but do not describe which form of palladium results. Furthermore, the jig electrolytic stripper is described to also remove nickel and copper (Table 13 and paragraph [0078] of the patent in suit).
- 6.12 For these reasons, the skilled person starting from Table 2 of D3 and having regard to the list of metals in paragraph [0033] of D3 would immediately understand that the disclosed etching compositions are applicable to ruthenium alloys containing palladium and would thus arrive in a straight-forward manner at an embodiment within the scope of claims 1 and 4.
- 6.13 Thus, the subject-matter of claims 1 and 4 does not involve an inventive step.

Auxiliary request 1

7. Article 12 RPBA 2020

7.1 The appellant was of the opinion that this request should not be admitted into the appeal proceedings because it was only filed during the oral proceedings before the opposition division and did not fulfil the requirements of Rule 116(2) EPC.

7.2 Auxiliary request 1 was first filed on 25 November 2020 (and thus within the time limit set under Rule 116(2) EPC) as the then auxiliary request 7 and only renumbered as auxiliary request 5 during the oral proceedings before the opposition division (points 3 and 10 of the minutes of the oral proceedings before the opposition division). Since a higher ranking request was allowed, this request was not dealt with in the impugned decision.

7.3 The respondent upheld this request as auxiliary request 1 in their reply to the statement of grounds of appeal as a defence against the appellant's appeal. Thus, having been admissibly filed and maintained during the opposition proceedings, auxiliary request 1 does not constitute an amendment to a party's case within the meaning of Article 12(4) RPBA 2020.

8. Article 123(2) EPC

8.1 The claims differ from those of the main request in that in claims 1 and 4, the lower and upper limits of the pH range have been more narrowly defined on the basis of the same passage of the original application considered for the main request (paragraphs [0043] and

[0049]). Claims 1 and 4 have been limited to the most preferred lower and upper limits of the pH range, i.e. the most preferred pH range, which is directly and unambiguously derivable from the indicated passage of the application as originally filed.

8.2 The other objections under Article 123(2) EPC were dealt with for the main request (see point 1.).

8.3 The requirements of Article 123(2) EPC are therefore met.

9. Articles 123(3), 84 and 83 EPC

9.1 The objections under Articles 123(3), 84 and 83 EPC were dealt with for the main request. The appellant did not bring forward any argument specific to auxiliary request 1, nor does the board see any.

10. Novelty

10.1 Novelty of the subject-matter of claims 1 and 4 of the main request over D3 was acknowledged (see point 5.). This conclusion also applies to the independent claims of auxiliary request 1, which additionally differ from the examples in Table 2 in that they specify a pH of 8 or more and 10 or less.

11. Inventive step

11.1 Document D3

- 11.1.1 Reference is made to the considerations set out for the main request (point 6.). As indicated, it could not be recognised that the jig electrolytic stripper used according to claims 1 and 4 of the main request had improved suitability for removing palladium as compared with ruthenium (point 6.7).
- 11.1.2 By contrast, the use and method, respectively, in claims 1 and 4 of auxiliary request 1 involve a narrower pH range which is particularly suitable for removing palladium. This may be derived from a comparison of the teachings of the patent in suit and D3. The examples of the patent in suit involve a pH of 8 (paragraphs [0061] and [0082]), and good palladium removal was obtained at this pH (Table 12). At the same time, it is known from D3 that the pH of 8 would be unsuitable for removing ruthenium (Comparative Example 1), the highest ruthenium removal rate being obtained near a pH of 11 (Table 2, [paragraph [0052]]), outside the range stipulated in the claims at issue.
- 11.1.3 It is furthermore shown in Table 20 of the patent in suit that the claimed pH range of 8-10 (values of 8.0, 9.0 and 10.0 being exemplified) is beneficial compared to the lower pH values of e.g. 7.0 or 6.0 used in the comparative examples because the pH values in the claimed range reduce the generation of sludge (paragraph [0094]). There is no indication or evidence that the intended palladium removal was not obtained in these examples.
- 11.1.4 In light of the above, the objective technical problem that may be formulated starting from Table 2 of D3 thus may not only be seen in extending the domain of application but also in providing another application

to which the etching composition (the jig electrolytic stripper) is specially adapted.

- 11.1.5 D3 discloses palladium as a possible component of a ruthenium alloy that may be etched (paragraph [0033]), but this disclosure would not have motivated the skilled person to modify the etching composition to specially adapt it to palladium removal. There is nothing in D3 that would have prompted the skilled person to select specifically a pH of 10 - this being the only value overlapping with the pH range specified in the claims at issue - in combination with the etching composition of Table 2, and to furthermore select a palladium containing ruthenium alloy. This is even more so as the exemplified pH value of 11 would be preferred because this is the pH near which the ruthenium etching rate is highest (paragraph [0052]), and ruthenium removal is the focus of D3.
- 11.1.6 Starting from D3, the skilled person would therefore not have arrived in an obvious manner at the subject-matter of claims 1 or 4.
- 11.2 Document D8
 - 11.2.1 Document D8 relates to an electrolytic stripping bath adaptable for rapidly and efficiently stripping a wide variety of metal deposits (column 2, lines 6-12). The electrolytic bath has a pH of 1 to 14, preferably 5.5 to 7.5 (column 3, lines 30-47); a range of 6.5 to 8.0 is used in Example 1.
 - 11.2.2 The technical problem posed may be seen as removing palladium from an object to be treated on which palladium is adhered (paragraph [0001] and claims 1 and

4) under effective conditions avoiding sludge formation (paragraph [0094]).

11.2.3 As the solution to this problem, the use and method of claims 1 and 4 are proposed, involving a pH of 8 or more and 10 or less.

11.2.4 It may be considered that the problem is solved having regard to the examples and Table 20. The appellant provided no evidence for their allegation that the results shown in Table 20 were specific to the jig electrolytic stripper exemplified, involving a specific ratio of bromide and nitrate, and could not be generalised.

11.2.5 D8 does not constitute a promising starting point for solving this technical problem and would not have led the skilled person to a use or method for removing palladium. While D8 specifies several metal deposits (column 2, lines 54-58), it does not mention palladium and is not specifically concerned with removing palladium.

11.2.6 The appellant argued that electroless and electrolytic metal plating methods usually involved an activation step using a palladium catalyst (D9, pages 1-2 "Background Art" and D10, paragraphs [0002]-[0007]) and that this implied or at least rendered obvious also removing palladium. According to the appellant, this was the case in D8 because it related to removing undesired metal from jigs used in plating processes (column 1, lines 6-15 and column 2, lines 54-60).

However, D8 does not describe in detail the actual metal plating process and does not mention any activation catalyst. It was not disputed that the need

for an activation catalyst only concerns metallising plastic substrates. D8, by contrast, describes metallising a metal substrate (column 1, lines 11-15). D8 mentions a protective plastic coating of a work rack (column 1, lines 16-24), but it is unknown whether any metal deposition occurred on the plastic coating. Furthermore, there is no evidence that palladium would be the only possible activation catalyst. For instance, a platinum compound, a gold compound and a silver compound may alternatively be used according to D10 (paragraph [0018]).

11.2.7 Moreover, while D9 discloses a stripping bath which can be used for removing palladium and also copper and nickel (claim 1 of D9), this does not amount to a generalisable teaching that any stripping bath for copper or nickel could be used for removing palladium. This is even more so as D9 mentions that the metal plating may be removed by known etching liquids, for example, copper chloride for copper, but that these etching liquids cannot remove the palladium plating (paragraph bridging pages 2-3).

11.2.8 In addition, it is known from D8 that a pH in the range of 5.5 to 7.5 is preferred, and there is no teaching that would have prompted the skilled person to adjust the pH to 8-10 to avoid sludge formation.

11.2.9 In light of the above, the skilled person had no guidance to use the electrolytic stripping bath known from D8, adjusted to pH 8-10, for removing palladium; doing so would have been based on hindsight.

11.3 Document D6

11.3.1 The same considerations (point 11.2, in particular point 11.2.9) apply to D6, which is similar (D6 being a continuation-in-part of D8) and discloses neither removing palladium nor a pH in the range of 8-10.

11.4 Document D4

11.4.1 These considerations also apply to D4, which is similar in that it mentions neither palladium nor a pH in the range of 8-10. D4 relates to electrolytically removing metals such as chromium, gold, cadmium, copper, brass, silver, zinc and/or tin from stainless steel (claim 1 of D4). The electrolytic stripping bath has a pH of 5 to 7.5, in particular 5.0 to 7.0 (claim 8 of D4).

11.5 Document D7

11.5.1 These considerations (point 11.2, in particular point 11.2.9) also apply to D7, which relates to electrolytically removing metals such as nickel, chromium, zinc, tin, copper, cadmium or silver from steel (D7, claim 1). It discloses a bath comprising nitric acid, ammonium acetate and bromide and having a pH of 7.1 (Example 1). D7 is silent on removing palladium and using a pH of 8-10.

11.6 Document D9

11.6.1 D9 was considered the closest prior art according to impugned decision and relates to the same general purpose as the patent in suit.

D9 relates to chemically stripping plated metals including palladium and at least one of copper and nickel, especially from racks used for combined

electroless and electrolytic metallising of objects
(page 1, lines 1-5).

The claimed invention (claims 1 and 4) differs from D9
in that a bromide (component (C)) is present and the pH
is 8-10.

- 11.6.2 In line with the appellant's view, the technical
problem may be seen in improving the removal of
palladium (paragraphs [0079] and [0080]).
- 11.6.3 The examples and comparative examples provided in the
patent in suit show that this technical problem is
solved by the claimed use (the claimed method) in which
the jig electrolytic stripper comprises a bromide and
has a pH of 8 or more and 10 or less.
- 11.6.4 The board is not convinced that the skilled person
would have been guided towards this solution by the
teaching of D8.

As indicated, D8 is not concerned with removing
palladium. Furthermore, the composition of the
electrolytic stripping bath in D8 is not comparable
with the one known from D9. The stripping bath of D8
may comprise a bath soluble inorganic nitrate and/or an
organic nitro compound, and additionally an inhibiting
agent comprising a glucoheptonic acid or malic acid.
Nitric acid may be used for pH adjustment in D8 (column
5, lines 3-25). The stripping bath known from D9, by
contrast, includes nitric acid, hydrogen peroxide,
sulphuric acid or phosphoric acid and possibly a
hydrogen peroxide stabiliser.

Accordingly, no similarity - whether in the target
metal or the composition of the stripping bath - is

seen that would have prompted the skilled person to employ the bromine activator taught in D8 in the stripping bath known from D9. Even if the stripping baths of D8 and D9 are both suitable for removing copper and nickel, this would not have led the skilled person to expect any advantage for palladium.

- 11.6.5 The teaching of D11 would not have motivated the skilled person to add a bromide to the stripping solution known from D9.

D11 is an excerpt from an encyclopaedia of electrochemistry and may thus be regarded as reflecting common general knowledge. It describes the anodic dissolution of palladium and teaches that this starts at relatively low positive potentials in the presence of chloride, bromide or iodide ions. However, D11 gives no preference to bromide ions and does not address the possible presence of other compounds.

- 11.6.6 Moreover, merely adding a bromide to the stripping bath of D9 would not result in the claimed subject-matter because the pH would additionally need to be adjusted to the claimed range of 8-10, which would not be compatible with the mixture of strong acids used in D9. The only disclosure in D9 on the pH is Example 2, in which the pH was kept within the limits of 2.0 to 4.5.

- 11.6.7 The objection of lack of inventive step in view of D9 as the closest prior art is therefore not convincing.

- 11.7 Documents D2 and D26

- 11.7.1 The objections of lack of inventive step based on D2 or D26 as the starting point are no more relevant than the one based on D9.

- 11.7.2 D2 mentions palladium as an additional component of a nickel-platinum alloy (paragraph [0040], claim 4). The relevant etching solution (second etching solution in D2) is generally described by listing suitable components (paragraphs [0050]-[0053]), the preferred etching solution being aqua regia (nitric acid and hydrochloric acid). The list of oxidising agents includes nitric acid, ammonia and ammonium nitrate. The list of complexing agents includes halogen ions including bromide. However, there is no specific disclosure of selecting nitric acid in combination with a bromide, let alone disclosure of additionally selecting ammonia or ammonium nitrate. Furthermore, D2 is silent on the pH of this etching solution. The preferred aqua regia inherently has a low pH.
- 11.7.3 D26 deals with removing palladium, but the subject-matter of claims 1 and 4 also differs from D26 in that a bromide (component (C)) is present and the pH is in the range of 8-10. Starting from D26, the distinguishing features and thus the objective technical problem are the same as for D9. D26 discloses the presence of a chloride, but chloride does not provide the same effect as bromide. The improved palladium removal is obtained in the presence of bromide but not chloride (Comparative Example 4 in comparison to Example 1 of the patent in suit). With the objective technical problem remaining the same, there is no reason why when starting from D26 a different conclusion should be reached.
- 11.8 In conclusion, the objections of lack of inventive step raised against claims 1 and 4 are not convincing.

11.9 The same conclusion applies to claims 2-3, which depend on claim 1; claims 5-7, which depend on claim 4; and claims 8 and 9, which include carrying out the method of claim 4.

12. Adapted description

12.1 The appellant raised no objections against the adapted description, and the board sees no reason to raise any.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of claims 1 to 9 according to the first auxiliary request submitted with the reply to the appeal and the amended description submitted during the oral proceedings before the board.

The Registrar:

The Chairman:



C. Vodz

P. Guntz

Decision electronically authenticated