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Datasheet for the decision of 2 August 2017

Case Number: T 0219/15 - 3.3.05

Application Number: 03760688.6

Publication Number: 1518284

IPC: H01M4/58

Language of the proceedings: EN

Title of invention:
CARBON-COATED LI-CONTAINING POWDERS AND PROCESS FOR PRODUCTION THEREOF

Patent Proprietor:
Umicore
Centre National de la Recherche Scientifique (C.N.R.S.)

Opponent:
Clariant Produkte (Deutschland) GmbH

Headword:

Relevant legal provisions:
EPC Art. 108, 100(b), 100(a), 104(1), 111(1)
EPC R. 103(1)(a)

Keyword:

Admissibility of appeal - (yes)
Transfer of opposition - (no)
Grounds for opposition - insufficiency of disclosure (no)
Novelty - (yes)
Inventive step - (yes)
Appeal decision - remittal to the department of first instance (no)
Substantial procedural violation - (no)
Apportionment of costs - (no)

Decisions cited:

G 0004/88, G 0002/04, R 0009/11, J 0006/98, T 1049/99, T 0204/00, T 0214/04, T 0960/08, T 0105/09, T 0872/09, T 1032/10, T 0184/11, T 0423/11, T 1563/13

Catchword:

Europäisches Patentamt
European Patent Office
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Case Number: T 0219/15 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 2 August 2017

Appellant: (Patent Proprietor 1)	Umicore Rue du Marais 31 1000 Brussels (BE)
Appellant: (Patent Proprietor 2)	Centre National de la Recherche Scientifique (C.N.R.S.) 3 rue Michel-Ange 75794 Paris Cedex 16 (FR)
Representative:	Banse & Steglich Patentanwaltskanzlei Herzog-Heinrich-Straße 23 80336 München (DE)
Appellant: (Opponent)	Johnson Matthey Public Limited Company 5th Floor 25 Farringdon Street London EC4A 4AB (GB)
Representative:	Boult Wade Tennant Verulam Gardens 70 Gray's Inn Road London WC1X 8BT (GB)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 2 December 2014 concerning maintenance of the European Patent No. 1518284 in amended form.**

Composition of the Board:

Chairman	E. Bendl
Members:	G. Glod
	O. Loizou

Summary of Facts and Submissions

I. The appeals of the opponent (appellant I) filed on 30 January 2015 and of the patent proprietors (appellant II) filed by letter of 5 February 2015 respectively lie from the interlocutory decision of the opposition division to maintain European patent EP 1 518 284 B1 in amended form on the basis of the set of claims of then pending auxiliary request 3. The patent as granted was found not to meet the requirements of Article 54 EPC.

The independent claims of the patent as granted read as follows:

"*1. Process for preparing a carbon-coated, Li-containing olivine or NASICON powder, comprising the steps of*
- preparing a water-based solution comprising, as solutes, one or more Li-containing olivine or NASICON precursor compounds and one or more carbon-bearing monomer compounds,
- precipitating the Li-containing olivine or NASICON precursor compounds and polymerising the monomer compounds in a single step
- heat treating the obtained precipitate in a neutral or reducing environment so as to form a Li-containing olivine or NASICON crystalline phase and decompose the polymer to carbon."

"*9. A carbon-coated $LiFePO_4$ powder for use in Li insertion-type electrodes,* ***characterised by*** *a reversible electrode capacity expressed as a fraction of the theoretical capacity and a total carbon content of*
at least 75 % capacity and less than 4 wt.% carbon, or,

at least 80 % capacity and less than 8 wt.% carbon; the capacity being determined when the carbon-coated $LiFePO_4$ powder is used as an active component in a cathode cycled between 2.0 and 4.5 V against a Li anode at a discharge rate of C/5 at 25 °C."

Claims 2 to 8 relate to preferred embodiments of the process of claim 1 and claims 10 and 11 refer to an electrode mix and a battery relating directly or indirectly to the powder according to claim 9.

II. The documents cited in the decision under appeal included the following:

E1: WO 02/083555 A2
E2: WO 02/099913 A1
E5: Huang et al.: Approaching Theoretical Capacity of LiFePO4 at Room Temperature at High Rates, Electrochemical and Solid-State Letters 4(10) A170-A172 (2001)E6: EP 1 049 182 A2
E7: Data obtained from example 4 of E1
E11: EP 1 261 050 A1
E12: EP 1 252 093 B1

III. Appellant I (opponent) informed the European Patent Office by letter of 30 March 2015 that the entire rights and duties relating to the appeal had been transferred to Johnson Matthey PLC. It also provided a copy of the assignment. Furthermore it requested that the assignment submitted be excluded from the public file.

IV. On 1 April 2015 the grounds of appeal were filed by the representative who had initially submitted the appeal for appellant I.

V. Appellant II submitted among others the following document:

E14: Arnold et al., "Fine lithium iron phosphate $LiFePO_4$ synthesized by a new low-cost aqueous precipitation technique", 2003, J. Power Sources 199-121, 247-251.

VI. By means of further letters of 26 October and 15 December 2015 appellant I submitted

E17: Affidavit from Dr Gerhard Nuspl
E18: (originally labelled E14): Experimental data recreating Example 4 of E1.

VII. In its communication pursuant to Article 15(1) RPBA the board expressed its preliminary opinion that the transfer of opposition was not sufficiently proven, the subject-matter of the claims of the patent as granted was novel, facts relating to the inventive-step objection should not be admitted into the appeal proceedings and that no substantial procedural violation had occurred.

VIII. Appellant II submitted a further auxiliary request.

IX. Oral proceedings before the board took place on 2 August 2017.

X. **Appellant I (opponent)** argued as follows:

Admissibility

It was up to the board to decide whom it considered to be appellant I, but in any case appellant I's appeal was admissible.

Novelty

The subject-matter of claim 1 of the main request lacked novelty with respect to E1, example 5.

The subject-matter of claim 9 lacked novelty for the following reasons:

Claim 9 was very broad and related to a carbon-coated $LiFePO_4$ (LFP) powder that was defined by an unusual parameter. This parameter was not an intrinsic property, since it related to the reversible electrode capacity and not to the capacity per se. It was not clear how the reversible electrode capacity had to be determined. The use of the word "an" did not exclude that besides the carbon-coated LFP powder other components were used in the cathode, which in itself was also not clearly described. This was confirmed by paragraph [0032] that allowed for the presence of carbon in the electrode. It was also not clear what was meant by "active component". Paragraphs [0022], [0042] and [0032] allowed for different interpretation so the active component could be the LFP only, the carbon-coated LFP powder or the carbon-coated LFP powder with other components. Since the parameter was the only distinguishing feature with respect to the prior art and ambiguous, the onus of proof could not simply lie on the opponent, in line with T 872/09 and T 1049/99.

Example 4 of E1 disclosed a powder according to claim 9 of the patent. Figure 6 of E1 showed that the reversible electrode capacity of the obtained powder determined by cycling between 2.9 and 4 V at a discharge rate of C/20 at 25°C was about 150°mAh/g. Based on the calculations, the carbon content of the

product of Example 4 of E1 must be less than 8wt% and could not plausibly be more than 4wt%. This was further confirmed by the examples submitted by the opponent during the opposition (E7) and appeal proceedings (E18), which had 0.83wt% and 3.4wt% carbon in the final products - the discrepancy in the carbon content being due to the different measurement techniques. E5 (figure 3) and the post-published document E14 (figure 6) submitted by appellant II as technical evidence showed that a change in discharge rate from C/20 to C/5 did not have a big impact on the measured capacity. The measurement method was not able to distinguish the 88% capacity disclosed in E1 from the claimed range of greater than 75%, preferably greater than 80%, due to its ambiguous definition.

This was supported by E7 that showed that the reversible electrode capacity measured at a discharge rate of C/20 was above 75% of the theoretical capacity. E17 confirmed that the results shown in E7 were obtained with a carbon-coated LFP obtained according to the instructions of example 4 of E1. The data in E7 were not merely a reproduction of the examples of E1, but measurements of the actual original stored samples from when the experiments in E1 were first prepared. Therefore, there was no need to remeasure the particle size distribution.

E18 too confirmed that the product of Example 4 had a capacity well above the required lower limit of 75%. E18 set out the opponent’s good-faith attempts to reproduce Example 4 of E1. One of the key reasons that this was produced was to provide a testable electrode material without the presence of additional carbon. It was accepted that there were minor deviations between

E18 and E1, but it was disputed that these were of any significance.

Therefore it could be concluded that the powder obtained in example 4 of E1 inevitably satisfied the requirements of claim 9 and no assessment of probability was required.

E6 was also novelty-destroying for the subject-matter of claim 9. The carbon-coated LFP contained 0.56% carbon (page 8, line 5) and showed a reversible electrode capacity measured at a low discharge rate at 25°C of 97.5% or more (paragraph [0051]). Therefore the LFP according to example 1 of E6 had to anticipate the product of claim 9.

Inventive step

Appellant I had not discussed inventive step of the then third auxiliary request during oral proceedings before the opposition division. Inventive step of the patent as granted had not however been a point of discussion before the opposition division. Appellant I had not withdrawn its written arguments, so they still applied to claim 1. No written decision had been provided with respect to inventive step and appellant I's arguments presented in writing; that amounted to a procedural violation. Remittal to the opposition division seemed therefore justified.

If the case was not remitted, appellant I should have the possibility to present its inventive-step arguments based on the case made in writing before the opposition division.

Claim 1 lacked inventive step in view of E5, since it would be obvious to simplify and improve the mixing of ingredients in the method of E5 by forming the gel in situ from the resorcinol and formaldehyde.

Claim 9 lacked inventive step in view of E12. It would be within the knowledge of the skilled person to achieve the capacity of claim 9 by taking routine steps to improve the electrode capacity (such as increasing the density and reducing the electrode thickness). E5 could be considered as closest prior art, since it disclosed an LFP/C composite with 15% by weight of carbon that had a reversible electrode capacity of over 93% of the theoretical capacity measured at a discharge rate of C/5. The only difference between the subject-matter of claim 9 and E5 was the carbon content. The problem to be solved was to reduce the carbon content without compromising capacity. Since claim 9 related to a result to be achieved, as it was formulated by a desideratum - namely a certain carbon content with a specified reversible electrode capacity - without providing the essential features necessary to achieve the result, the solution of reducing the carbon content was obvious.

Remittal

As the opposition division had not commented on inventive step, remittal of the case was necessary.

Apportionment of costs

Apportionment of cost was not justified, since documents had been filed late by all parties and the overall number of documents was not excessive. The additional data submitted was a reaction to the

proprietor's position and could not be regarded as an abuse of procedure.

XI. Arguments of **appellant II (patent proprietors)** can be summarised as follows:

Admissibility

The appeal of appellant I was not admissible, since the grounds of appeal had been filed by the representative of Clariant Produkte (Deutschland) GmbH. The alleged new opponent Johnson Matthey PLC had failed to file grounds of appeal.

Since it was not clear from the excerpts from the contract if the business had been transferred completely and without the seller retaining any rights, it was not clear who the opponent (appellant) was, contrary to G 02/04.

Novelty

None of the prior-art documents disclosed directly and unambiguously the process of claim 1, in which a precipitation of an inorganic material and polymerisation of an organic material were carried out from the same aqueous solution in a single step.

Claim 9 related to a powder and not to a mixture of the powder with different components. This powder was used as a cathode without any other material present for determining the capacity. This was described in paragraph [0041] and clear to the skilled person reading the claim with a mind willing to understand. This was also in line with appellant I's statement of grounds (page 2, second paragraph). The active material

was LFP. The reversible electrode capacity of the carbon-coated LFP was measured and the result multiplied with the ratio of the active material. The claimed reversible electrode capacity of the powder was due to its special structure as explained in [0025] and was an intrinsic property of the material such as for example the melting point.

E1 did not disclose directly and unambiguously carbon-coated LFP particles according to claim 9. Example 4 was silent about the carbon content of the powder. Calculations did not enable the carbon content to be predicted, since the yield of the precipitation reaction used to produce LFP was not indicated. The capacity shown in figure 6 was obtained at different conditions (C/20 and 2.9 to 4 V) that could not be extrapolated to the conditions claimed. Details of the setup of the cathode were missing. Experimental details that affected the properties of the material obtained were missing from example 4 (page 4, lines 14 to 22 and 28 to 31). The importance of the reaction conditions was also confirmed by E14 (figure 2).

E7 was not a detailed experimental report as required by the case law, so its results could not be verified. The opponent had added 5% binder and 5% carbon black when determining the capacities according to E7. Increasing the carbon content by 5% significantly affected the reversible capacity. There was no indication whether the capacity shown in E7 was the reversible electrode capacity in line with claim 9.

E17 confirmed that the applicant and Dr Nuspl had neither control nor knowledge of how the material described in E7 was obtained. Details regarding the process conditions for preparing the material, and

structural information about the material, were missing.

E18 was not relevant, since it contradicted E7/E17 submitted by the opponent at least regarding the carbon content, the electrochemical properties were significantly better than those of a material disclosed in example 4 of E1, the opponent had failed to confirm the structural identity by determining the particle size and distribution, the proportion of the components had been changed at least regarding the lactose content, the heating, drying and calcination conditions had been changed, the deagglomeration conditions for obtaining a powder were not disclosed, and binder had been added without considering the effect on reversible electrode capacity.

The reversible electrode capacity in E6 had been determined at a different discharge rate (C/40) and in the presence of 5% carbon and 10% binder, so no conclusion could be drawn about the capacity measured under the claimed conditions.

Inventive step

The opponent had refused to discuss inventive step at the oral proceedings before the opposition division, so this discussion should not be admitted in appeal proceedings. "Forum shopping" should not be allowed.

Starting from E5 the problem to be solved was to provide an improved carbon-containing LFP powder with good electrochemical properties. E5 did not provide any incentive to use less than 8% carbon in the LFP powder and still get good reversible electrode capacity. Further it was doubtful that the process disclosed in

E5 was feasible with less carbon and that it led to a powder having the required electrochemical properties.

Procedural violation

The opposition division had committed several procedural violations. When basing lack of novelty on post-filing evidence E7, it had ignored the effect of 5% extra carbon in a product of E1, it had said the patent proprietor's failure to provide detailed information was the reason why the opponent had not reproduced E7 adequately, and had assumed that a disclosure under Article 54(3) EPC could be complemented by common general knowledge. Lastly, it had not taken into account the submissions of the patent proprietor, in particular the reference to the decisions cited in support of its argumentation, had not allowed the patent proprietor's expert to testify during the oral proceedings, and had refused auxiliary request I without giving the patent proprietor the opportunity to comment on admissibility.

Apportionment of costs

Appellant I was using salami tactics, and its overall conduct had been unfair and abusive since the beginning of the proceedings, which justified the apportionment of costs.

XII. Requests

Appellant I (opponent) requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

Appellant II (proprietors) requested that the appeal of appellant I be rejected as inadmissible, that the decision under appeal be set aside and that the patent be maintained as granted (main request).

In the alternative, appellant II requested that the patent be maintained in amended form on the basis of the set of claims of one of auxiliary requests 1 or 2, or that the appeal of appellant I (opponent) be dismissed and that the patent be maintained in amended form on the basis of the set of claims of auxiliary request 3, or that the patent be maintained on the basis of auxiliary request 4, all auxiliary requests submitted on 28 July 2014, or of auxiliary request 5, submitted with letter dated 2 May 2017.

Furthermore appellant II (proprietors) requested reimbursement of the appeal fee and apportionment of costs.

Reasons for the Decision

1. Party status and admissibility of the appeal of appellant I

The appeal was filed by the opponent Clariant Produkte (Deutschland) GmbH of Lenbachplatz 6 in Munich. A request for transfer of the opposition to Johnson Matthey PLC was filed by letter of 30 March 2015. The evidence provided does not conclusively establish that the entire rights and obligations relating to the appeal were transferred to Johnson Matthey PLC.

An opposition pending before the EPO may "*be transferred or assigned to a third party as part of the*

opponent's business assets together with the assets in the interests of which the opposition was filed" (G 4/88 [order], G 2/04 [2.2.2]).

In the present case, it cannot be concluded from the readable parts of the "Share and Asset Purchase Agreement" submitted on 30 March 2015 that the business assets, i.e. the opposition proceedings relating to the patent in suit, were sold by Clariant Produkte (Deutschland) GmbH to Johnson Matthey PLC. In fact the seller mentioned in the agreement is Clariant AG Rothausstrasse 61 in Muttenz, Switzerland and it is not clear what is meant by "the sale of the Company's global Clariant Energy Storage business" (page 23 of the annex to the letter of 30 March 2015). However, from point 3.7 (c) (page 16 of the annex) it is evident that Clariant can remain party to opposition proceedings for the benefit of the purchaser (i.e. Johnson Matthey PLC). This is also in line with the fact that the statement setting out the grounds of appeal was submitted by the representative who filed the appeal for Clariant Produkte (Deutschland) GmbH.

This position of the board was already indicated to the parties in its communication pursuant to Article 15(1) RPBA of 27 February 2017 and not further commented on by the opponent. Instead, in its further submissions dated 30 June 2017, "Clariant Produkte (Deutschland) GmbH/Johnson Matthey PLC" were designated as the opponent.

Therefore, the request for transfer of the status of opponent is to be refused.

The opponent "Clariant Produkte (Deutschland) GmbH" is therefore appellant I and remains party to the

proceedings, holding all procedural rights and obligations (see also T 1032/10 [1.2.5], T 184/11 [2.1], T 1563/13 [2.4 and 2.5]).

The statement setting out the grounds of appeal was submitted by the professional representative of "Clariant Produkte (Deutschland) GmbH" and fulfils the requirements of Rule 99(2) EPC, so the appeal of appellant I is admissible.

According to G 2/04 [1.3], there should be no doubt as to who may validly exercise procedural rights and to whom official actions by the EPO are to be addressed at any given time throughout the proceedings. It is established jurisprudence that until evidence of the transfer has been provided, the original party to the proceedings continues to have the relevant rights and obligations (T 960/08 [2.2 and decisions cited therein]). In the present case, the board considered the evidence presented to be insufficient (see reasons supra), thus Clariant Produkte (Deutschland) GmbH (opponent) remained appellant I.
Appellant II argued that during the proceedings there had been doubt about the identity of appellant I (see supra).
The board cannot see that a request for the transfer of opposition had any negative consequences on the proceedings as a whole nor that it had adversely affected appellant II in any way. The representative of the opponent submitted information after commencement of the appeal proceedings to show the alleged transfer of the business relating to the opposed patent and had been at the same time authorised representative of the alleged new opponent. In agreement with T 423/11 [4], the board concludes that even if the situation were

unclear this had no impact on the overall procedure, i.e. the appeal proceedings.

2. Sufficiency of disclosure

The opposition division ruled in the decision under appeal that the invention was sufficiently disclosed. Neither appellant I nor appellant II contested this finding. The board sees no reason to take a different stance.

3. Novelty of the patent as granted

3.1 The main point of debate was the novelty of the subject-matter of claim 9. Prior to addressing the different prior-art documents, the scope of claim 9 needs to be established.

Claim 9 relates to a carbon-coated $LiFePO_4$ (LFP) powder that is characterised by a reversible electrode capacity relative to the theoretical capacity dependent on the total carbon content. The capacity is determined when the powder is used as an active component in a cathode cycled between 2.0 and 4.5 V against a Li anode at a discharge rate of C/5 at 25°C. The question arises whether it is unambiguous to the skilled person how the capacity should be determined. The powder is only indicated as "an" active component, which allows for the presence of other components in the cathode. However, when reading the claim as a whole, the skilled person would understand that the claim is directed to a powder and that it is either the capacity of the carbon-coated LFP powder that is of relevance or the capacity of the LFP only. Therefore, he would recognise that the wording of claim 9 is ambiguous in view of "an active component" and would turn to the description for

clarification (see Case Law of the Boards of Appeal, 8th edition 2016, II.A.6.3.3).

Paragraph [0022] specifies that the fraction of the theoretical capacity is calculated based on the active product in the electrode. Further it is indicated that for LFP a specific theoretical capacity of 170 mA/g is assumed. Since the ratio (capacity of the active product contained in the electrode to the theoretical capacity of the active product) is calculated with respect to the theoretical capacity of LFP, the skilled person would conclude that only LFP is to be considered as the relevant active component.

Paragraph [0032] distinguishes between active material and coated-carbon, so the skilled person can understand that the active material for determining the reversible electrode capacity is supposed to be LFP, since carbon does not participate in the redox reactions. From paragraph [0041] it is clear that the positive electrode (cathode) is the powder obtained directly from the process of production, which means that no additional carbon and/or binder are added.

The skilled person will deduce from these passages that the capacity is determined by using only the powder as cathode material, and will calculate the capacity by correcting for the presence of the non-active carbon coat.

Paragraph [0042] seems to some extent to contradict this, because 85% of the theoretical capacity is indicated for the active material when using 24% of coated carbon. The skilled person would understand that here the active material can only be the coated powder, since it is indicated that the performance of the total

electrode is impaired by the large quantities of carbon, which implies that the performance is not that good with respect to the LFP alone.

Therefore, the skilled person would understand from the description as a whole that the reversible electrode capacity of claim 9 only relates to the capacity of the active component, which is LFP only.

The reversible electrode capacity itself is not an unusual parameter and the skilled person knows how to adapt the potential range and the discharge rate. This is also in line with appellant I's submissions of 1 April 2015 (page 2, second paragraph), acknowledging that the reversible electrode capacity is a reproducible technical parameter. Therefore T 872/09 [1.3] that relates to a functional feature of an electrochemical sensor under undefined operating conditions is not relevant to the present case. The same applies to T 1049/99 [4.6.3] that relates to a photostable composition, wherein "photostable" has no well-defined meaning.

3.2 With this interpretation of claim 9 in mind, the board comes to the conclusion that all claims of the main request fulfil the requirements of Article 54 EPC for the following reasons:

3.2.1 E1 (prior art under Article 54(3) EPC), in particular example 5, does not disclose the step of "precipitating the Li-containing olivine or NASICON precursor compounds and polymerising the monomer compounds in a single step" present in process claim 1 of the patent as granted. This position of the board was already indicated to the parties in the communication pursuant to Article 15(1) RPBA of 27 February 2017 and not

further commented on by appellant I. Therefore, the subject-matter of claim 1, and of claims 2 to 8 that directly or indirectly depend thereon, is novel over E1. No further novelty objection was raised for claim 1.

3.2.2 E1 discloses in example 4 the preparation of $LiFePO_4$ containing carbon by impregnation with lactose. E1 is silent about the carbon content and its calculation is not unambiguous, since the yield of the precipitation reaction is not indicated, with the result that it is not known how much of the reactants initially present are available for impregnation after precipitation and washing. Furthermore, the capacity of the material obtained under conditions laid down in claim 1 of the patent is not disclosed. Figure 6 was generated at different conditions (discharge rate of C/20 between 2.9 and 4.0 V). It is not credible that the same results were obtained at a discharge rate of C/5 between 2.0 and 4.5 V, since it is known that the discharge rate has an influence on the measured capacity (see E5, figure 3; E14, figure 6). This influence depends on the cycling range and on the type of material. There is no evidence that it can be predicted from one material to another.

Example 4 of E1 anticipates the novelty of the subject-matter of claim 9 only, if said subject-matter is directly and unambiguously derivable from it. This means that the material obtained in example 4 of E1 should have the properties of claim 9. In other words, a reworking of example 4 should **inevitably** lead to a product having such properties. It is up to the opponent alleging this to prove its case.

3.2.3 During opposition proceedings E7 was submitted as evidence that the material obtained in example 4 of E1 was a product according to claim 9 of the patent. E17 indicates that the samples used to produce the data shown in E7 were obtained from one of the inventors of E1 and had allegedly been synthesised according to the instructions of example 4 of E1. The carbon content was apparently 0.83%.

Reworking a prior-art example should be done in such a manner that it can be easily understood how the sample was produced and how the measurements with the sample were performed. Therefore, it is necessary to provide a detailed test report that complies with certain standards and contains all the required information. Such information should allow the other party to rework the experiments provided. In the present case, however, E17 is completely silent about the details of the product that was measured by Sanyo Europe GmbH. E17 only indicates that samples according to example 4 of E1 were requested, but it does not contain any details about the sample finally received. Even if it was an original sample stored when the experiments in E1 were first prepared, there are no details about the production method and the particle size distribution that would permit the unambiguous conclusion that the measured sample was indeed a sample according to example 4 of E1. There is no reason why such information about the experimental procedure should be missing. As a consequence it cannot be concluded without doubt that the data presented in E7 relates to a sample according to example 4 of E1, the particle size distribution of which is represented in figure 5 of E1.

3.2.4 Appellant I also submitted E18, which is supposed to represent a reproduction of example 4 of E1. However, E18 does not correctly repeat example 4, since the amount of lactose and the calcination conditions differ. Further, the reversible electrode capacity was determined in the presence of a binder, which is contrary to the method claimed (see point 3.1). It is at least surprising that the carbon content (3.4%) is significantly different from the carbon content indicated for the material used in E7 (0.83%), even bearing in mind that this difference was apparently due to different measurement methods. Details of the measurement methods were not provided.

There are no reasons why the method of E18 differs from the method of E4, and the effect on the obtained product and subsequently the measured reversible electrode capacity is only speculation. Appellant I has not provided any particle size distribution of the product obtained in E18 that would allow a comparison with the product of example 4 of E1 when considering figure 5 of E1.

Appellant I has not convincingly shown that the deviation from the conditions specified in E1 is not material to the outcome of the measurement of the reversible electrode capacity. Therefore, in line with T 204/00 [3.1], the board can only conclude that E18 does not provide clear and convincing evidence that E1 anticipates the novelty of the subject-matter of claim 9.

3.2.5 E6 discloses in example 1 LFP coated with a carbonaceous deposit having 0.56% of carbon (paragraphs [0043] and [0044]). This material was tested at room temperature, whereby the composite cathode was prepared

by mixing the active material with carbon black and EPDM (ethylene propylene diene monomer) in a ratio of 85:5:10. Figure 6 shows voltamperograms that were obtained at room temperature under slow voltammetry (20 $mV.h^{-1}$) between 3 and 3.8 V. The entire theoretical capacity is accessible (97.5% cycle 1, 99.4% cycle 5), i.e. reversibly exchanged without loss during cycling (5 cycles) (paragraphs [0050] and [0051).

Consequently, in E6 the discharge rate and the voltage used for cycling are different from the conditions presently claimed. Furthermore, besides the carbon-coated LFP, additional carbon and a binder are used in the cathode, which is different from the capacity determination of claim 9 (see point 3.1 above). Since the cathode composition and the discharge rate affect the measured capacity (see E5, figure 3; E14, figure 6), the reversible electrode capacity under the conditions laid down in claim 9 cannot be derived directly and unambiguously from E6. The subject-matter of claim 9 is therefore also novel vis-à-vis E6.

3.2.6 Since the subject-matter of claim 9 is novel, the same applies to claims 1 to 8, 10 and 11, that directly or indirectly depend on claim 9.

4. Inventive step

4.1 During oral proceedings before the opposition division, appellant I stated that it would not discuss inventive step of auxiliary request 3 in opposition proceedings, but in appeal (see minutes of the oral proceedings before the opposition division, point 5.1). This is also confirmed in the decision under appeal (point 3).

During the written proceedings before the opposition division, the appellant only raised an inventive-step objection against dependent claim 8 as granted in view of the combination of E1 and E2 (notice of opposition, page 6, first paragraph), against claim 1 as granted in view of E5 (letter of 9 January 2014, page 16, first full paragraph), against claim 9 as granted in view of E11 in combination with E6 (letter of 9 January 2014, point 6.1) and against claim 9 in view of E12 (letter of 9 January 2014, point 6.2).

4.2 Therefore, the ground of opposition based on Article 100(a) in combination with Article 56 EPC was as such part of the opposition proceedings (see also point 3 of the reasons of the decision under appeal).

4.3 Claim 1

Regarding claim 1, appellant I only raised a very brief general objection based on the preparation method of E5. However, E5 does not disclose the step of "precipitating the Li-containing olivine or NASICON precursor compounds and polymerising the monomer compounds in a single step". There is no prior art that teaches precipitation and polymerisation in a single step. There is also no reason why the skilled person would do this in E5, since it is not evident that the presence of all components in a single mixture would lead to an acceptable gel. Appellant I has also not provided any indication why it would be an obvious variation of the process of E5 to do the precipitation and gel-formation in a single step. The reasoning of appellant I is based on hindsight.

4.4 Claim 9

4.4.1 The invention relates to a carbon-coated LFP powder for use in Li insertion-type electrodes.

4.4.2 The board agrees with appellant I that E5 can be considered as closest prior art. E5 discloses an LFP/C composite having 15% by weight of carbon (page A170, right-hand column, last paragraph). Electrochemical cells were constructed using a Swagelok design. The cathode composite comprised 5 wt% binder (PVF) and had a total carbon content of 20 wt% in all cases (page A171, right hand column, last paragraph). At a discharge rate of C/5, 93% of the Li was accessible (page A172, left-hand column, third paragraph).

4.4.3 The problem to be solved by the present invention is to provide a powder having good electrochemical properties (paragraph [0009]).

4.4.4 As a solution to the problem a powder according to claim 9 is proposed, characterised by a reversible electrode capacity expressed as a fraction of the theoretical capacity and a total carbon content of at least 75 % capacity and less than 4 wt% carbon, or at least 80 % capacity and less than 8 wt% carbon; the capacity being determined when the carbon-coated $LiFePO_4$ powder is used as an active component in a cathode cycled between 2.0 and 4.5 V against a Li anode at a discharge rate of C/5 at 25 °C.

4.4.5 It is accepted that said problem is successfully solved, since figures 3 and 5 of the patent in suit show that with relatively low amounts of carbon good specific capacities are obtained. Nor is there any evidence to the contrary.

4.4.6 The solution to the problem is not obvious for the following reasons:

Although the solution to the problem relates to a parameter defining properties, the skilled person would understand that this parameter defines certain characteristics of the powder necessary to obtain the desired properties.

E5 is completely silent about LFP/C composites having less than 8 wt% carbon. The skilled person does not get any hint that the reduction in carbon would allow him to get a powder with a good reversible electrode capacity. E5 does not teach that the carbon content can be reduced and that the desired electrochemical properties can still be obtained, but rather teaches to increase the amount of carbon, since the cathode composite comprises 20 wt% carbon in all cases.

E6 discloses in example 1 LFP coated with a carbonaceous deposit having 0.56% of carbon, but there is no evidence that a composite comprising such low amounts of carbon and produced by the method of preparation disclosed in E5 would lead to a powder having the claimed reversible electrode capacity.

E1 and E11 are only relevant under Article 54(3) EPC and therefore do not represent prior art for the question of inventive step.

E12 relied on by appellant I is not prior art, since it is the B publication (see opponent I's submission of 9 January 2014, page 19, bottom). However the non-cited A publication (WO-A-0153198) is prior art. In any case, no problem-solution approach was presented and the board cannot see why the subject-matter of claim 9

should be obvious in view of E12. E12 does not contain any information regarding the reversible electrode capacity determined in accordance with claim 1. Appellant I has not provided any evidence why so-called routine steps could be considered as known to the skilled person and that these steps would inevitably lead to a powder having the claimed reversible electrode capacity.

4.4.7 Therefore, the subject-matter of claim 9 is not derivable from the cited prior art.

4.5 Since the subject-matter of claim 9 involves an inventive step, the same applies to the process for the preparation of the powder according to claim 9, i.e. claim 1, and to claims 2 to 8 and 10 to 11, that directly or indirectly depend on said claims.

5. Remittal

According to appellant I the opposition division committed a procedural violation, since it did not comment in the impugned decision on inventive step, especially of claim 1 (see letter of 30 June 2017, items 3.9 and 3.11), that was unchanged as compared to the patent as granted. Therefore, the case should be remitted to the opposition division to discuss inventive step.

The only inventive-step objection that was raised during opposition proceedings against claim 1 of the patent as granted, which was the only unchanged independent claim still present in the then third auxiliary request, was an objection based on E5 (letter of 9 January 2014, page 16, first full paragraph; see

also item 4.1 supra). This objection is identical to the objection raised in appeal proceedings.

The opposition division interpreted the silence of opponent I on inventive step during the oral proceedings as meaning that the opponent had no comments on inventive step of auxiliary request 3 (point 3 of the impugned decision). Although the opposition division did not extensively comment on said minimally substantiated objection in the decision, it nonetheless indicated that it saw no reason why this objection could call inventive step into question (see reasons 3, second paragraph, last sentence of the impugned decision), which shows that it took the objection into consideration. In view of the particular situation - the lack of fully substantiated reasoning on inventive step and the unusual position of the opponent during oral proceedings before the opposition division in not commenting on inventive step - the board considers that the opposition did not commit a procedural violation, but rather erred in its judgement.

The board sees no reason to remit the case, for the following reasons:

Firstly, the EPC does not guarantee the parties an absolute right to two instances in the sense that parties are entitled to have every aspect of fact or law on which a board of appeal bases its decision examined previously by the first instance (see J 6/98, [4]; T 105/09, [2.6]; T 214/04, [3]). Secondly, appellant I declined to discuss inventive step before the opposition division, so there is no reason to provide him with another chance to do so. Further, the substantiation of the inventive-step objection was not

extensive during the written appeal proceedings, so that the board saw no reason not to deal with it during oral proceedings. Furthermore, said request was only made late in the proceedings, i.e. after the communication under Rule 15(1) RPBA. A remittal would unnecessarily lengthen the overall proceedings, which would not be in line with procedural economy.

6. Reimbursement of the appeal fee

6.1 Appellant II alleges that the opposition committed several procedural violations and that therefore the reimbursement of the appeal fee is justified in accordance with Rule 103 (1)(a) EPC. The board does not agree for the following reasons:

The opposition division provided reasons in points 2.2.3 to 2.2.6 of the impugned decision as to why it considered that the subject-matter of claim 9 lacked novelty with respect to E1. It stated that it considered E7 highly relevant and judged that the burden of proof for showing the contrary rested with the patent proprietor. The reasoning is presented in a comprehensible manner, but does not include any reference to the decisions cited in the submissions of the parties, which is understood as meaning that the opposition division judged these decisions not relevant to the present case.

The fact that the opposition division's conclusion is not upheld by the board is not linked to a procedural violation by the opposition division. It is rather based on a wrong evaluation of the evidence, facts and arguments by the opposition division. It is established case law that a wrong assessment may be regarded as a substantive error, but is not a procedural violation

(Case Law of the Boards of Appeal of the EPO, 8th edition 2016, chapter IV.E.8.4.5).

6.2 According to the minutes of the oral proceedings (point 1.5.1), the chairman announced that, at the discretion of the opposition division, both experts were allowed to talk under the responsibility of the attorney. As appellant II did not ask for correction of the minutes, its allegation that its technical expert was not given the opportunity to comment on the addition of carbon to LFP is therefore unfounded.

6.3 It is also stated in said minutes that the chairman indicated that auxiliary request 1 was not admitted into in the proceedings (point 4.1). The wording "indicated" does not permit the conclusion that this was the final position of the opposition division and that the parties did not have the possibility to comment on it. There is no indication in the minutes that the proprietor asked to be able to present its position in this respect and that the opposition division refused to hear appellant II on the admissibility of auxiliary request 1. Again, no request for correction of the minutes was made. Any party is expected actively to participate in the oral proceedings and safeguard its interests (R 09/11, reasons 3.1.7). No violation of appellant II's right to be heard is therefore apparent.

7. Apportionment of costs

The board understands that the request for a different apportionment of costs in accordance with Article 104(1) EPC relates to the additional costs incurred by appellant I because of the filing of documents E17 and E18 in the course of the appeal proceedings (point V of

letter of 24 February 2016). This request is refused, for the following reasons:

According to Article 114(2) EPC, Article 12(2) RPBA and Article 13(1) RPBA, it is evident that a party is allowed to submit new documents and evidence during appeal proceedings, but their admission is at the discretion of the board. In the present case, the board considers that E17 and E18 were a reaction of appellant II challenging the results of E7. Their submission cannot be considered an abuse of procedure causing an unreasonable amount of extra work for appellant II. Therefore, there are no reasons to apportion costs.

Furthermore, the arguments relating to "salami tactics" and to co-operation with respect to details on E7 relate at least partly to the overall procedure including the opposition proceedings. However, appellant II did not ask for an apportionment of costs before the opposition division. It is not apparent, and nor has it been substantiated, how any unjustified extra work allegedly caused by appellant I during opposition proceedings had an impact on appeal proceedings.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is maintained as granted.
3. The request for reimbursement of the appeal fee is rejected.
4. The request for apportionment of costs is rejected.

The Registrar: The Chairman:

L. Stridde E. Bendl

Decision electronically authenticated