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Datasheet for the decision of 25 November 2014

Case Number: T 1419/11 - 3.3.05

Application Number: 01108177.5

Publication Number: 1143549

IPC: H01M10/40, H01M4/62, H01M4/02

Language of the proceedings: EN

Title of invention:
Non-aqueous electrolyte secondary battery

Applicant:
Sony Corporation

Headword:
FILM-STATE NON-AQUEOUS SECONDARY BATTERY/SONY CORPORATION

Relevant legal provisions:
EPC Art. 54, 56, 111(1), 123(2)

Keyword:
Amendments - added subject-matter (main request, auxiliary requests 1,3,4,6 and 7) - (yes)
Inventive step - auxiliary requests 2 and 5 - (no)
Remittal to the department of first instance - (no)

Decisions cited:
T 0190/99, T 0231/01

Catchword:

Case Number: T 1419/11 - 3.3.05

DECISION
of Technical Board of Appeal 3.3.05
of 25 November 2014

Appellant: (Applicant)	Sony Corporation 7-35, Kitashinagawa 6-chome Shinagawa-ku Tokyo (JP)
Representative:	Müller - Hoffmann & Partner Patentanwälte St.-Martin-Strasse 58 81541 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 9 February 2011 refusing European patent application No. 01108177.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Raths
Members:	H. Engl
	M. Blasi

Summary of Facts and Submissions

I. European patent application EP 01108177.5, published as EP-A-1 143 549, is concerned with a non-aqueous electrolyte secondary battery.

II. The following documents were *inter alia* cited in the International Search Report:

D1: Patent abstracts of Japan vol. 2000, no. 01,
31 January 2000, & JP-A-11 283668
(Sanyo Electric Co Ltd)

D2: WO-A-99/34 471 (Tonen Corp) (8 July 1999)
&
D2a: US-B 6 383 688 (7 May 2002)

D3: Database WPI, Section Ch, Week 199938,
Thomson Scientific, London, GB; Class E12,
AN 1999-449698 & JP-A-11 185 811 (Tonen Corp.)

D4: FR-A-2 761 531 (Ube Industries)

D5: EP-A-0 895 296 (Sanyo Electric Co;
Showa Denko KK)

D6: WO-A-98/26 469 (Valence Technology Inc.)

III. The European patent application was refused by the examining division on grounds of lack of inventive step having regard to D5 (main request); the auxiliary requests were rejected because they offended Articles 123(2), 84 and partly also Article 56 EPC.

IV. The appellant's notice of appeal was received by letter dated 8 April 2011. The statement of grounds of appeal, dated 7 June 2011, included new sets of claims as a main and a first and second auxiliary requests.

V. The board issued a communication pursuant to Article 15(1) RPBA, in which it raised in a preliminary and non-binding way objections under Article 123(2) EPC against claims 1 of the main and first auxiliary requests, as well as objections of lack of novelty (based on D5) and lack of inventive step starting from D2 or D4 (second auxiliary request).

VI. The appellant's reply of 20 October 2014 was accompanied with new claims as third to eighth auxiliary requests.

VII. Claims 1 of the pending requests read as follows:

Main request:

"1. A non-aqueous electrolyte secondary battery comprising:

a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,

wherein concentration in mass ratio of a free acid in the electrolyte layer is 60 ppm and less controlled by adjusting the drying time to be 5 days to 1 week and the gelling temperature to be 70 to 75°C."

First auxiliary request:

"1. A non-aqueous electrolyte secondary battery comprising:

a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,

wherein concentration in mass ratio of a free acid in the electrolyte layer is 60 ppm and less controlled by adjusting the drying time to be 5 days to 1 week and the gelling temperature to be 70 to 75°C, wherein in fabrication of the electrolyte after drying the lithium, salt *[sic]* solvent and polymer material the electrolyte is gelled."

Second auxiliary request:

"1. A non-aqueous electrolyte secondary battery comprising:

a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,

wherein concentration in mass ratio of a free acid in the electrolyte layer is 60 ppm and less controlled by adjusting the drying time to 5 days and the gelling temperature to 70°C or the drying time to one week and the gelling temperature to 70°C or the drying time to 5 days and the gelling temperature to 75°C, wherein in fabrication of the electrolyte after drying the lithium salt *[sic]* solvent and polymer material the electrolyte is gelled."

Third auxiliary request:

"1. A non-aqueous electrolyte secondary battery comprising:

a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,

wherein concentration in mass ratio of a free acid in the electrolyte layer is 60 ppm and less controlled by adjusting the drying time to be 5 days to 1 week and the gelling temperature to be 70 to 75°C, and

wherein the electrolyte layer is made of a lithium salt, a non-aqueous solution, and a polymer material, and at least one of $LiPF_6$, $LiBF_4$, $LiAsF_6$, $LiClO_4$, $LiCF_3SO_3$, $Li(CF_3SO_2)_2N$, $LiC_4F_9SO_3$, LiCl, and LiBr is mixed as a lithium salt."

Fourth auxiliary request:

"1. A non-aqueous electrolyte secondary battery comprising:

a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,

wherein concentration in mass ratio of a free acid in the electrolyte layer is 60 ppm and less controlled by adjusting the drying time to be 5 days to 1 week and the gelling temperature to be 70 to 75°C, wherein in fabrication of the electrolyte after drying the lithium salt, solvent and polymer material the electrolyte is gelled,

wherein the electrolyte layer is made of a lithium salt, a non-aqueous solution, and a polymer material, and at least one of $LiPF_6$, $LiBF_4$, $LiAsF_6$, $LiClO_4$, $LiCF_3SO_3$, $Li(CF_3SO_2)_2N$, $LiC_4F_9SO_3$, LiCl, and LiBr is mixed as a lithium salt."

Fifth auxiliary request:

"1. A non-aqueous electrolyte secondary battery comprising:

a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,

wherein concentration in mass ratio of a free acid in the electrolyte layer is 60 ppm and less controlled by adjusting the drying time to 5 days and the gelling temperature to 70°C or the drying time to one week and the gelling temperature to 70°C or the drying time to 5 days and the gelling temperature to 75°C, wherein in fabrication of the electrolyte after drying the lithium salt, solvent and polymer material the electrolyte is gelled,

wherein the electrolyte layer is made of a lithium salt, a non-aqueous solution, and a polymer material, and at least one of $LiPF_6$, $LiBF_4$, $LiAsF_6$, $LiClO_4$, $LiCF_3SO_3$, $Li(CF_3SO_2)_2N$, $LiC_4F_9SO_3$, LiCl, and LiBr is mixed as a lithium salt."

Sixth auxiliary request:

"1. A process for preparing non-aqueous electrolyte secondary battery comprising:

providing a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,

wherein the electrolyte layer is made of a lithium salt, a non-aqueous solution, and a polymer material, and at least one of $LiPF_6$, $LiBF_4$, $LiAsF_6$, $LiClO_4$, $LiCF_3SO_3$, $Li(CF_3SO_2)_2N$, $LiC_4F_9SO_3$, LiCl, and LiBr is mixed as a lithium salt; and

adjusting the concentration in mass ratio of a free acid in the electrolyte layer to 60 ppm and less controlled by adjusting the drying time to be 5 days to 1 week and the gelling temperature to be 70 to 75°C."

Seventh auxiliary request:

"1. A process for preparing non-aqueous electrolyte secondary battery comprising:

providing a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,

wherein the electrolyte layer is made of a lithium salt, a non-aqueous solution, and a polymer material, and at least one of $LiPF_6$, $LiBF_4$, $LiAsF_6$, $LiClO_4$, $LiCF_3SO_3$, $Li(CF_3SO_2)_2N$, $LiC_4F_9SO_3$, LiCl, and LiBr is mixed as a lithium salt; and

adjusting the concentration in mass ratio of a free acid in the electrolyte layer to 60 ppm and less controlled by adjusting the drying time to be 5 days to 1 week and the gelling temperature to be 70 to 75°C,

wherein in fabrication of the electrolyte after drying the lithium salt, solvent and polymer material the electrolyte is gelled."

Eighth auxiliary request:

"1. A process for preparing non-aqueous electrolyte secondary battery comprising:

providing a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,

wherein the electrolyte layer is made of a lithium salt, a non-aqueous solution, and a polymer material, and at least one of $LiPF_6$, $LiBF_4$, $LiAsF_6$, $LiClO_4$, $LiCF_3SO_3$, $Li(CF_3SO_2)_2N$, $LiC_4F_9SO_3$, LiCl, and LiBr is mixed as a lithium salt, and

adjusting the concentration in mass ratio of a free acid in the electrolyte layer to 60 ppm and less controlled by adjusting the drying time to 5 days and the gelling temperature to 70°C or the drying time to one week and the gelling temperature to 70°C or the drying time to 5 days and the gelling temperature to 75°C,

wherein in fabrication of the electrolyte after drying the lithium salt, solvent and polymer material the electrolyte is gelled."

VIII. Oral proceedings took place on 25 November 2014.

IX. The appellant essentially argued as follows:

Added subject-matter:

In the appellant's view, the range of the drying time of five days to one week and the gelling temperature were directly and unambiguously derivable from the application as originally filed. These two features related to a two-step process involving first drying and secondly gelling the electrolyte. The skilled person would not consider the three distinct pairs of values for the drying time and the gelling temperature in examples 2-1 to 2-3 as single point disclosures. In particular, the skilled person would understand that these pairs of values were not inextricably linked together. In this respect the appellant referred to T 190/99. The examples showed that either the gelling temperatures or the drying times could be varied to achieve the desired effect of adjusting the free acid concentration. Two different ranges were disclosed wherein the specific parameter could be chosen within the given boundaries to achieve the desired effect of adjusting the free acid concentration to 60 ppm or less.

Therefore, the requirements of Article 123(2) EPC were met.

Novelty:

An objection of lack of novelty based on document D5 had for the first time been raised in the board's annex to the summons to oral proceedings. It was argued that in view of the fact that similar cell capacities were achieved in D5, the free acid concentrations must also be similar to those as claimed. However, example 1 of D5 was not strictly identical to the respective example of the present application as it differed in the concentration of $LiPF_6$ and the electrolyte composition. D5 did not disclose the concentration of the free acid of 60 ppm or less. Referring in particular to T 231/01, the appellant argued that any speculation should be avoided in assessing novelty.

Should the board come to different conclusions, the applicant requested that the case be remitted to the examining division for further investigation.

Inventive step:

Starting from D5, the application represented a significantly different conceptual approach for solving the problem of cell swelling and leakage. D5 taught to remove the water present in the cell or penetrating into the cell, by means of an absorbent (alumina). D5 did not mention the initial HF content of the cell.

In contrast thereto, the present application aimed at bringing the initial free acid concentration (the concentration after the electrolyte was obtained) to 60 ppm or less. Accordingly, D5 considered the HF effect which was produced by water present in the cell, whereas the subject-matter of claim 1 of the main request dealt with the initial free acid concentration obtained after producing the electrolyte.

The various beneficial effects associated with keeping the initial free HF concentration at 60 ppm or less were absolutely surprising. The advantages were demonstrated by experimental data in the description and include preventing a change in shape of the battery, stable and excellent capacity characteristics and charge/discharge characteristics.

Starting, alternatively, from D2 (or D2a) as the closest prior art, this document disclosed a method of removing water and a free acid content from an electrolytic solution in a lithium battery by using an inert gas for drying. Problems of maintenance of shape, maintenance of excellent capacity characteristics and of stable charge/discharge characteristics were not addressed in D2a. Since a totally different technical problem was solved, the skilled person would not consider D2a as the closest prior art. Furthermore, D2a did not relate to film-state packaging members.

As regards document D4, similar arguments applied as to D2. D4 did not concern a film-state packaging member and would not be taken into consideration as the closest prior art. In D4 a molecular sieve and water absorbing agent were used for drying the electrolyte. Therefore, D4 involved a different conceptual approach than the subject-matter of the application under appeal.

In the contested decision, D5 was considered to represent the closest prior art. If the board intended to dismiss the appeal based on lack of inventive step in view of D2 and/or D4 as the closest prior art, the appellant requested that the case be remitted to the examining division in order to give the appellants the opportunity of having the application examined by two instances.

Other objections:

The appellant also disagreed with the board's provisional opinion that the benefits of the invention could only be achieved by using the lithium salts recited in claim 7. Since this objection was raised for the first time, it was requested to remit the case to the department of first instance in order to give the appellant two instances to decide on this question.

X. Requests

The appellant requested that the decision under appeal be set aside and the patent be granted on the basis of the claims of the main request, the first or the second auxiliary requests, filed with the statement of grounds of appeal, or on the basis of the claims of the third to eighth auxiliary requests, filed with letter of 20 October 2014.

Reasons for the Decision

1. Amendments

1.1 Claims 1 of the main request and the first, third, fourth, sixth and seventh auxiliary requests contravene Article 123(2) EPC, because the claim features relating to a "drying time period of 5 days to 1 week" and to a "range of gelling temperatures of 70 to 75°C" are not disclosed in combination in the application as originally filed.

1.2 The application as originally filed discloses on pages 22, 26 and 27 combinations of particular drying times (5 days, 1 week) and particular gelling temperatures (70°C, 75°C). These combinations are indeed recited in claims 1 of the second, fifth and eighth auxiliary request. In contrast, the respective claims 1 of the main request and auxiliary requests 1, 3, 4, 6 and 7 relate to a combination which is neither as specific as the embodiments described nor as general as the general teaching of the application ("intermediate generalisation").

1.3 The appellant argued in the appeal brief that the construction of ranges from distinct values of drying time and gelling temperature, respectively, was allowable because said parameters were not functionally related to each other. However, in the opinion of the board, this is no so, because the examples (Table 1) clearly suggest that the negative effect of a short drying time on the free acid content can - at least partly - be compensated for by a low gelling temperature, and *vice versa.*

The appellant argued that drying and gelling of the electrolyte were two distinct and separate steps of manufacturing the polymer electrolyte layer in accordance with the application under appeal. It referred in particular to page 26, lines 7 to 13, disclosing a process wherein "in fabrication of the electrolyte, after sufficiently drying the lithium salt, solvent and polymer material, the electrolyte is gelled at low temperature of about 70°C" (emphasis added by the board). Consequently, the drying time and gelling temperature could be chosen independently.

The board is not convinced by this argument.

Firstly, the passage relied upon by the appellant fails to indicate the temperature at which the drying step is to be carried out. As the drying process is strongly temperature-dependent, such an omission qualifies any indication of drying times.

Secondly, from several other passages of the description, no separation of drying and gelling steps can be derived. Reference is in particular made to Examples 1-1 to 1-31, as described on page 22, lines 3 to 8: "The mixture solution was stored in a drying chamber for one week or longer and heated to about 70°C so as to be gelled" and to Comparative Examples 1-1 to 1-29 (page 22, lines 18 to 21): "...storage time in the dying *[sic]* chamber was set to one day and the heating temperature was set to 80 to 90°C". The board considers that the skilled person when performing the invention disclosed in the patent under appeal would follow the combined process of drying/gelling, wherein the temperatures of the drying/gelling are the same.

1.4 For these reasons, claims 1 of the main request and first, third, fourth, sixth and seventh auxiliary requests violate Article 123(2) EPC and are therefore not allowable.

Second and fifth auxiliary request

2. Novelty

2.1 The Appellant argued that the feature of claim 1 relating to the concentration of a free acid of 60 ppm and less was neither explicitly nor implicitly disclosed in document D5.

2.2 Since the subject-matter of claim 1 of the fifth auxiliary request was held to lack an inventive step (see point 3 below), there was no need for the board to deal in detail with novelty.

2.3 For the benefit of the Appellant, it was therefore assumed that the subject-matter of claim 1 of the second and fifth auxiliary requests meets the requirements of Article 54 EPC.

3. Inventive step

3.1 The invention

The present application is concerned with a film-type (laminated) non-aqueous, polymer electrolyte secondary battery wherein acid corrosion in the battery and subsequent increase in internal resistance and expansion of the laminated battery are suppressed (see application as filed, page 18, lines 1 to 8, and page 6, second paragraph).

3.2 Closest prior art

D4 may be regarded as the closest prior art because this document deals with the problem of reducing free acid in a non-aqueous electrolyte secondary battery.

3.3 Problem

According to the application in suit, the problem was to provide a battery capable of suppressing shape change and suppressing deterioration in battery characteristics (application as filed, page 4, lines 17 to 19) or in other words, a film-type (laminated) non-aqueous, gel polymer electrolyte secondary battery having high initial discharge characteristics and showing no or little expansion.

3.4 Solution

As a solution to that problem, the application proposes a non-aqueous secondary battery according to claim 1 of the second auxiliary request, characterised in that the concentration in mass ratio of a free acid in the electrolyte layer is 60 ppm and less controlled by adjusting the drying time to 5 days and the gelling temperature to 70°C or the drying time to one week and the gelling temperature to 70°C or the drying time to 5 days and the gelling temperature to 75°C, and in that in fabrication of the electrolyte after drying the lithium salt, solvent and polymer material the electrolyte is gelled.

The solution according to auxiliary request 5 differs from the solution according to auxiliary request 2 in that the lithium salts have been specified.

3.5 Success of the solution

Table 1 (page 27 of the application) shows the following test results (data made up by the board with the figures of drying time and gelling temperature, taken from the description of the respective examples):

invention	free acid° (ppm)	initial discharge capacity (mAh)	capacity sustain ratio (%)	change in shape	drying time (days)	gelling temperature (°C)
example 2-1	25	582	95	*	7	70
example 2-2	50	584	95	*	5	70
example 2-3	60	571	93	*	5	75

comparison	free acid (ppm)	initial discharge capacity (mAh)	capacity sustain ratio (%)	change in shape	drying time (days)	gelling temperature (°C)
example 2-1	100	511	89	**	1	80
example 2-2	200	494	84	**	0	85-95
example 2-3	400	481	81	**	0	95-105

*hardly occurred
°free acid = the term "free acid" denotes an acid generated when the lithium salt in the electrolyte is decomposed due to the presence of moisture or when the electrolyte is heated (see page 17, lines 18 to 23).
**expansion

These data suggest that by observing the conditions of drying time and gelling temperature an electrolyte with a free acid content of 60 ppm or lower can be obtained and that film state batteries made therefrom exhibit high charge/discharge capacity and no change in shape (no swelling or leakage).

The comparative data prove that a change in shape occurred (an expansion) when the drying time and gelling temperatures were not respected. However, they are not representive for embodiments of the closest prior art.

Although no comparison with respect to the closest prior art is available, and although the Comparative Examples 2-1 to 2-3 are deficient in that more than one parameter have been altered with respect to Examples 2-1 to 2-3, the board accepts, to the benefit of the appellant, that the problem has effectively been solved.

3.6 Obviousness

3.6.1 It remains to be decided whether the claimed subject-matter is obvious having regard to the prior art or, in other words, whether there are hints in the prior art relating to a correlation between
(a) a low level of free acid content and
(b) good battery properties.

(1) Document D4

(a) free acid content

Document D4 discloses a lithium secondary battery comprising an electrolyte solution having an HF content of below 30 ppm. Such a low HF electrolyte may be obtained by thoroughly purifying the organic solvent(s) by crystallisation and/or rectification, followed by drying with molecular sieves and water absorbing agents (see page 7, lines 19 to 33, page 8, lines 6 to 14; example 1). The mixed EC/DMC/$LiPF_6$ electrolyte of example 1 exhibits a residual HF content of only 9 ppm.

(b) battery properties

Coin-shaped lithium batteries made from said low HF electrolytes exhibit superior capacity, cycle characteristics and longer shelf life (see D4, page 20, lines 8 to 14and page 25, line 34 to page 36, line 6).

The subject-matter claimed in the instant application differs from D4 by the shape of the battery (film-type battery vs. coin-shaped) and in that the electrolyte is gelled. However, it must be observed that D4 is not limited to a particular structure of the battery (coin, cylindrical or prismatic battery) (see D4, page 14, lines 24 to 32). Film-shaped sealed batteries are known per se and the skilled person would immediately realise that essentially the same benefits as in D4 could be obtained with a film-shaped, gel-type lithium polymer electrolyte battery.

Claim features relating to the drying time and the gelling temperature are not considered to provide a distinction over D4 at the level of the claimed product. These process parameters are limiting the product claim only inasmuch as the claimed battery must possess the inevitable properties resulting from said process steps. In terms of residual free acid content, the non-aqueous electrolyte secondary batteries obtained in accordance with D4 clearly fall below the 60 ppm limit of claim 1 of the instant application.

(2) Document D5

As mentioned above, sealed film-type (laminated) non-aqueous secondary batteries containing a gel-type polymer electrolyte are known in the art and described for instance in document D5. In accordance with D5, a gelled electrolyte is obtained by thermal polymerisation at 80°C of the polyethylene glycol diacrylate prepolymer in the battery (examples 17 to 58, Figures 2 to 5).

(3) Further aspects

The lithium salts recited in claim 5, last paragraph, are conventional in the art (see D2, D4, D5).

3.6.2 Therefore, the subject-matter of claim 1 of the second and fifth auxiliary requests does not involve an inventive step (Article 56 EPC).

Eighth auxiliary request

3.7 Invention

As far as
(1) the invention,
(2) the closest prior art and
(3) the problem are concerned, it is referred to the reasons 3.1, 3.2 and 3.3 which apply *mutatis mutandis* to the eighth auxiliary request.

3.8 Solution

As a solution to the problem as defined under 3.3, the application proposes a process for preparing a non-aqueous, polymer electrolyte secondary battery sealed in a film-state packaging member according to claim 1 of the eighth auxiliary request, characterised in that the concentration in mass ratio of a free acid in the electrolyte layer is 60 ppm and less controlled by adjusting the drying time to 5 days and the gelling temperature to 70°C or the drying time to one week and the gelling temperature to 70°C or the drying time to 5 days and the gelling temperature to 75°C, and in that in fabrication of the electrolyte after drying the lithium salt, solvent and polymer material the electrolyte is gelled.

3.9 Success of the solution

The board accepts that the problem has effectively been solved. See reasons 3.5.

3.10 Obviousness

It remains to be decided whether the claimed subject-matter is obvious having regard to the prior art or, in other words, whether there are hints in the prior art relating to a correlation between a low level of free acid content and good battery properties.

3.10.1 The board refers to the reasons 3.6 (1), (2) and (3) which apply *mutatis mutandis* to the eight auxiliary request; under 3.6.(2) the following remarks apply:

It is not apparent in which respect a gelling temperature of 70 or 75°C, as defined in claim 1 of the eighth auxiliary request, would be patentably distinct from the prior art, in particular as the claim does not specify the kind of polymer to be gelled.

Although said claim features relating to the drying time and the gelling temperature do provide a distinction over D4 at the level of the claimed process, they do not provide batteries having lower residual free acid content than the non-aqueous electrolytes secondary batteries obtained in accordance with D4.

A drying time of five days or one week is not considered to involve an inventive step, either. In the board's view, the indication of drying times without specifying other equally important conditions such as drying atmosphere and temperature, is not very meaningful from a technical point of view.

The appellant argued that the claimed narrow selection of drying times and gelling temperatures would per se be indicative of inventiveness.

The board disagrees, because the selected values, although narrow, are not purposefully selected. For instance, it is evident that a drying time of, say, six days instead of five days, or one week, under slightly modified conditions of atmosphere and temperature, would give essentially the same results. The same applies to the gelling temperatures.

3.10.2 It is furthermore self-evident that a long drying time is beneficial for a complete removal of water (which is known to be the cause for the generation of free acid; see D2, D5) from the electrolyte. The claimed drying times of 5 days or 1 week are the result of an obvious, non-purposive choice, because Examples 1-1 to 1-31 of the application demonstrate that even drying times longer than one week may be successfully employed (see page 22).

As regards the gelling temperatures, it is known from D2 (column 1, lines 26 to 30) that electrolyte salts such as $LiPF_6$ thermally decompose under formation of HF. It would thus be obvious to carry out the gelling of the polymer electrolyte at temperatures which are high enough for the gelling reaction to proceed smoothly, but low enough for preventing decomposition. Finding the most suitable temperature would be a matter of routine investigation and the exact temperatures would inter alia depend on the chemistry of the polymer. For example, D5 reports a gelling temperature of 80°C for an acrylate polymer (see paragraph [0078]). It follows from the above considerations that the proposed gelling temperatures of 70°C and 75°C, for unspecified polymers, cannot be regarded as involving an inventive step.

3.10.3 Therefore, the subject-matter of claim 1 of the eighth auxiliary request does not involve an inventive step (Article 56 EPC).

4. Remittal

4.1 The appellant requested that the case be remitted to the examining division, if the appeal was dismissed on the basis of lack of inventive step in view of D2 and/or D4 as the closest prior art.

4.2 Under Article 111(1) EPC the board of appeal may either exercise any power within the competence of the department which was responsible for the decision appealed or remit the case to that department for further prosecution. It is therefore a matter of discretion whether or not the board remits a case.

4.3 In the instant case, the board considers it appropriate not to remit the case to the examining division, for the following reasons.

It is established case law that there is no absolute right for a party to have an issue decided upon by two instances (see Case Law of the EPO, 7th edition 2013, page 1028, IV.E.7.6.1, in particular the decisions cited therein).

Documents D2 and D4 had already been discussed during the examination proceedings and the relevance of these documents also for the appeal proceedings was brought to the appellant's attention in the communication of the board dated 7 August 2014. Therefore, the appellant must have been aware of these documents for a long time and had sufficient time for preparing its defense at the oral proceedings before the board.

The interest of procedural economy was a further criterion taken into consideration by the board. As the present application had been filed in the year 2001 claiming a priority date of 4 April 2000, a remittal would unduly lengthen the overall procedure.

In view of the above, the board decided to decide itself on the case in accordance with Article 111(1) EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

Beschwerdekammern des Europäischen Patentamts ✦ Boards of Appeal of the European Patent Office ✦ Chambres de recours de l'Office européen des brevets

C. Vodz G. Raths

Decision electronically authenticated