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Datasheet for the decision of 2 July 2026

Case Number: T 0466/25 - 3.3.05

Application Number: 19809995.4

Publication Number: 3806190

IPC: H01M4/62, H01M4/13, H01M10/0525, H01M50/403, H01M50/426, H01M50/449, C08F214/22, C08F214/28, C08L27/16, C09D127/16

Language of the proceedings: EN

Title of invention:

RESIN COMPOSITION FOR NONAQUEOUS ELECTROLYTE SECONDARY BATTERY, SEPARATOR FOR NONAQUEOUS ELECTROLYTE SECONDARY BATTERY USING SAME, RESIN COMPOSITION FOR ELECTRODE MIXTURE LAYER, ELECTRODE FOR NONAQUEOUS ELECTROLYTE SECONDARY BATTERY, AND NONAQUEOUS ELECTROLYTE SECONDARY BATTERY

Patent Proprietor:

Kureha Corporation

Opponent:

ARKEMA FRANCE S.A.

Headword:

RESIN COMPOSITION/Kureha Corp.

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It can be changed at any time and without notice

Relevant legal provisions:
EPC Art. 54, 123(2)
RPBA 2020 Art. 13(2)

Keyword:
Novelty - implicit disclosure (yes/no) - public prior use - implicit obligation to maintain secrecy (no) - public prior use (yes) - public prior use - burden of proof
Amendments - allowable (no) - intermediate generalisation - undisclosed disclaimer
Amendment after summons - exceptional circumstances (no)

Decisions cited:
G 0001/03, G 0002/03

Catchword:

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Case Number: T 0466/25 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 2 July 2026

Appellant: (Opponent)	ARKEMA FRANCE S.A. 51 Esplanade du Général de Gaulle La Défense 92800 Puteaux (FR)
Representative:	Bandpay & Greuter 11 rue Christophe Colomb 75008 Paris (FR)
Respondent: (Patent Proprietor)	Kureha Corporation 3-3-2, Nihonbashi-Hamacho Chuo-ku Tokyo 103-8552 (JP)
Representative:	Zimmermann & Partner Patentanwälte mbB P.O. Box 330 920 80069 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted/electronically transmitted on 28 January 2025 rejecting the opposition filed against European patent No. 3806190 pursuant to Articl e 101(2) EPC.**

Composition of the Board:

Chair	R. Winkelhofer
Members:	J. Roider
	R. Elsässer

Summary of Facts and Submissions

I. The appeal by the opponent (appellant) lies from the opposition division's decision to reject the opposition against European patent No. 3 806 190 B1.

The patent in suit is directed to poly(vinylidene fluoride-co-hexafluoropropylene)(PVDF-HFP), a resin composition for non-aqueous electrolyte secondary batteries.

II. The following documents, which were cited in the decision under appeal, are relevant here:

D1 US 6,586,547 B1

D6 J. E. K. Schawe, "Remarks regarding the determination of the initial crystallinity by temperature modulated DSC", Thermochimica Acta 657, 5 September 2017, 151–5

III. Claim 1 of the main request (patent as granted) reads as follows:

"1. A resin composition for a non-aqueous electrolyte secondary battery comprising:
a vinylidene fluoride copolymer having a constituent unit derived from vinylidene fluoride and a constituent unit derived from a fluorine-containing alkyl vinyl compound, wherein
a melting point, measured in accordance with ASTM D3418, of the vinylidene fluoride copolymer is from 105°C to 125°C, the fluorine-containing alkyl vinyl compound is hexafluoropropylene,
a mass fraction W_a of the constituent unit derived from

the fluorine-containing alkyl vinyl compound in the vinylidene fluoride copolymer, a degree of crystallinity D_C of the vinylidene fluoride copolymer, and a degree of amorphicity D_A of the vinylidene fluoride copolymer satisfy Equation (1):

$$4.7 \leq W_a \times (D_C/D_A) \leq 14 \quad (1),$$

the mass fraction W_a is 18 mass% or greater and 30 mass% or less, and wherein W_a, D_C and D_a are measured as described in the specification."

IV. Claim 1 of each of the auxiliary requests reads as follows.

Claim 1 of auxiliary request 0 differs from claim 1 of the main request in that the following disclaimer was added at the end of the claim:

"with the proviso that the resin composition does not comprise the vinylidene fluoride hexafluoropropylene copolymer having a hexafluoropropylene content of approx. 25 wt% as disclosed in Figs. 1 and 3 of US 6,586,547 B1 in the form described therein."

V. Claim 1 of auxiliary request A differs from claim 1 of the main request in that the following text was added at the end of the claim:

"wherein the degree of crystallinity DC of the vinylidene fluoride copolymer is calculated from the following equation, and melting enthalpy of full crystal of polyvinylidene fluoride in the following equation is 104.5 J/g,

$$\text{Degree of crystallinity } D_C\,[\%] = \frac{\text{True melting enthalpy of vinylidene fluoride copolymer [J/g]}}{\text{Melting enthalpy of full crystal of polyvinylidene fluoride [J/g]}} \times 100$$

"

VI. Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the following text was added at the end of the claim:

"and wherein Dc is calculated by measuring a melting enthalpy of reversing heat-flow measured with a temperature modulation differential scanning calorimeter."

VII. Claim 1 of auxiliary request 2 differs from the main request in that the lower limit of the range for W_a was amended to 18.9 mass% (from 18.0 mass%).

VIII. Claim 1 of auxiliary request 3 differs from the main request in that the range for W_a was amended to 20 mass% or greater and 29 mass% or less (from 18 mass% or greater and 30 mass% or less).

IX. Claim 1 of auxiliary request 4 differs from claim 1 of the main request in that Equation (1) was amended as follows (amendments marked by the board):

$$\underline{7.2}\sout{4.7} \leq W_a \times (D_C/D_A) \leq 14 \quad (1),$$

X. Claim 1 of auxiliary request 5 combines the amendments of auxiliary requests 1 and 2.

XI. Claim 1 of auxiliary request 6 combines the amendments of auxiliary requests 1 and 3.

XII. Claim 1 of auxiliary requests 7 to 9 contain, inter alia, the same amendment as auxiliary request 4.

XIII. The appellant argued that the main request was not novel; auxiliary request 0 was not to be admitted; auxiliary requests 1 to 3, 5 and 6 lacked novelty; and the amendments to auxiliary requests 4 and 7 to 9 had

no basis in the application as filed.

XIV. The respondent (patent proprietor) argued that the patent and the auxiliary requests fulfilled the requirements of the EPC.

XV. The requests with regard to the substance were as follows.

(a) The appellant requests that the decision under appeal be set aside and amended such that the patent be revoked.

(b) The respondent requests that the appeal be dismissed (main request) or that the patent be maintained on the basis of auxiliary request 0, filed during the oral proceedings before the board, or on the basis of any one of auxiliary request A and auxiliary requests 1 to 9, in that order (all submitted before the opposition division).

Reasons for the Decision

Main Request

1. Claim 1, novelty, Article 54(1) and (2) EPC

1.1 Measurement of the "true" melting enthalpy

Claim 1 refers, in general terms ("measured as described in the specification"), to the method described in the description for determining, inter alia, the degree of crystallinity (D_C) of a polymer sample.

1.1.1 As acknowledged by the respondent, the relevant disclosure can be found in paragraphs [0132] to [0134] of the description.
The determination of D_C includes a step requiring the measurement of the "true" melting enthalpy of the PVDF-HFP copolymer in accordance with paragraph [0134].

A polymer sample such as PVDF-HFP will have an initial crystalline content that could be zero if the sample were totally amorphous and less than 100% if the polymers were semicrystalline.

For a given semicrystalline polymer, the melting enthalpy depends on the initial D_C.

A complication in determining the initial D_C is that additional crystallisation may occur during heating in the form of cold crystallisation. As a result, the measured melting enthalpy comprises not only the melting of crystals originally present in the polymer sample but also the melting of crystals formed during the measurement itself. The total melting enthalpy does not allow these two contributions to be distinguished. Consequently, it cannot represent the melting enthalpy associated with the initial polymer sample and its original D_C.

In principle, the melting enthalpy is an intrinsic material property and should therefore not depend on the instrument or measurement technique used to determine it. Both conventional differential scanning calorimetry (DSC) and temperature-modulated differential scanning calorimetry (TMDSC) are suitable methods for determining the melting enthalpy and for accounting for the effects of cold crystallisation, although they do so by different methodological

approaches. Moreover, both techniques are based on the same thermodynamic principles and determine the heat flow into and out of a sample during thermal transitions. Accordingly, both methods are capable of determining the same physical quantity, namely the true melting enthalpy of the material.

This is also apparent from Equation (5) in D6, p. 152, which shows that the sum of the enthalpies of the reversing and non-reversing heat-flow curves obtained from the TMDSC measurement is identical to the melting enthalpy determined from the total heat flow (which corresponds to the conventional DSC method).
As described in section 4 of D6, p. 153, and illustrated in Fig. 3, the apparent differences often cited in the literature result from arbitrary baseline selections rather than a fundamental difference in the material's behaviour or the measurement technique's capability.
Hence, D6 shows that the melting enthalpy measured by TMDSC provides no genuine advantage over conventional DSC for determining initial crystallinity and that the values are mathematically linked.

The mere fact that upon measuring the melting enthalpy of PVDF-HFP, DSC and TMDSC might deliver slightly different results due to instrumental sensitivities, heating rates or data evaluation choices (as shown in Fig. 3 of D6), does not render a prior-art PVDF-HFP different from the claimed PVDF-HFP.
Measurement artefacts cannot convert a known product into a novel one.

1.1.2 The respondent argued in favour of novelty of the patent (main request) that its paragraph [0134] stated that for determining D_C, the "true" melting enthalpy

needed to be determined first, namely by calculating it "by measuring the melting enthalpy of reversing heat flow". Hence, the meaning of "true" was defined in paragraph [0134]. The skilled person would immediately recognise that the step of calculation referred to the determination of the area between the abscissa and the curve representing the reversing heat flow, i.e. the integral of the curve.
The definition of the claimed subject-matter alone required using only the reversing heat flow, and not the non-reversing heat flow, to determine the (initial) D_C.
The reversing heat flow as determined by TMDSC was similar to the total heat flow determined by DSC only in exceptional cases, namely only when the non-reversing heat flow was about zero. However, PVDF-HFP always showed a significant non-reversing heat flow because this type of material underwent significant cold crystallisation during the heating. The energy released during the cold crystallisation was represented in the non-reversing heat flow. The scale of the difference was apparent from paragraph 72 of the reply to the appeal. It showed that the reversing heat flow was significantly different to the total heat flow. This was consistent with Fig. 1 of D6. Although it represented PET and thus a different polymer, the same principles applied to the PVDF-HFP. It followed from D6, Fig. 1 that the reversing heat flow was 134.3 J/g while the total heat flow was only 50.59 J/g because only the heat flow around the melting point had to be taken into account. The D_C calculated in analogy with the patent (D6 concerning PET and not PVDF-HFP) was 96%, while the D_C calculated using the total heat flow was 36% (=134.3/140 x 100 vs 50.59/140 x 100; with the formation enthalpy of fully crystalline PET of 140 J/g).

While relying on D6, the respondent also challenged D6 on the grounds that its author might have an interest in presenting DSC favourably compared with TMDSC and that D6 thus did not give a neutral and unbiased picture.
They concluded that the use of the total heat flow instead of the reversing heat flow resulted in a significant deviation from the true value of the melting enthalpy.

1.1.3 This is not convincing.

Paragraph [0134] requires the determination of the "true" melting enthalpy as defined there. However, the vague wording "calculated by measuring" requires interpretation. A possible reading of this passage is indeed the one proposed by the respondent, namely that the "true" melting enthalpy is obtained by determining the area between the abscissa and the measured reversing heat-flow curve.

Yet, the skilled reader learns from paragraph [0132] of the patent that the true enthalpy is to be used for calculating the D_C. Therefore, they would reject the understanding of a method of calculating the true melting enthalpy if it leads or could lead to D_C values that are manifestly wrong. This is the case here for the following reasons.

Taking Fig. 1 of D6 as an example, calculating the D_C solely from the reversing heat flow, as proposed by the respondent, yields an initial crystallinity of approximately 96%. While such a value is not impossible, it cannot be correct for the material investigated because this material undergoes cold crystallisation at around 130°C, increasing its

crystallinity by roughly one third. While this cold crystallisation event is not reflected in the reversing heat-flow curve, it is nevertheless real and cannot be ignored. Starting from an initial crystallinity of 96%, such an increase would imply a final crystallinity well in excess of 100% above about 130°C, which is physically impossible.

The skilled person would therefore recognise that using only the reversing heat flow, as advocated by the respondent, can lead to a substantial overestimation of the initial crystallinity. It follows that the phrase "calculated by measuring the melting enthalpy of reversing heat flow with a temperature modulation differential scanning calorimeter" (paragraph [0134]) cannot be interpreted to mean that the "true melting enthalpy" is obtained by simply calculating the area between the abscissa and the measured reversing heat-flow curve, as suggested by the respondent, because this could lead to nonsensical results.

In the absence of further guidance on how to interpret paragraph [0134], the skilled person resorts to common general knowledge, according to which the melting enthalpy, when determined with TMDSC, relies on a calculation including the reversing heat flow but is not based on the reversing heat flow alone. Accordingly, paragraph [0134] is most reasonably understood as referring to the melting enthalpy obtained in a TMDSC measurement.

As summarised in paragraph 1.1.1 above, the melting enthalpy determined by TMDSC corresponds to the same physical quantity as the melting enthalpy measured by conventional DSC. They are numerically equivalent within the normal limits of experimental error. The

skilled person would therefore have no reason to regard the use of TMDSC as imposing a requirement to determine a fundamentally different quantity from that measured by conventional DSC.
The respondent can thus not rely on the mere allegation that the claimed product differs from the products of the prior art solely because different methods were used to determine the melting enthalpy. This applies equally to differences in the measurement conditions, including the choice of temperature ramp.

Concerning the trustworthiness of the disclosure in D6, the explanations provided in D6 are internally consistent and supported by a coherent mathematical framework. The respondent has not demonstrated that the analysis in D6 is incorrect, nor have they provided evidence that, in the case of the claimed PVDF-HFP copolymer, TMDSC yields a melting enthalpy that differs from the value obtainable by conventional DSC or reveals information that conventional DSC is incapable of capturing.

In these circumstances, the respondent's assumption that the author of D6 may have had a particular interest in presenting DSC in a favourable light, and thus not giving accurate results, is baseless. The trustworthiness of D6 depends on the soundness of its technical reasoning and supporting evidence, not on any alleged personal or commercial interest of its author. In the absence of substantiated technical reasons to question the correctness of D6, there is no reason to dismiss its conclusions.

1.2 Novelty of claim 1 vis-à-vis D1

The subject-matter of claim 1 lacks novelty over D1.

Figs 1 and 3 show a PVDF-HFP with an HFP content of around 25 wt%, which has a melting enthalpy of approximately 20 J/g and a melting point of around 112°C.

With $D_C=\Delta H_m/\Delta H_{m0}$, $D_A=1-D_C$ and $\Delta H_{m0}=104.5$ J/g according to paragraphs [0132] to [0135] of the patent in suit, the parameter $W_a\times(D_C/D_A)$ equals 5.9 ($=W_a\times\Delta H_m/(\Delta H_{m0}-\Delta H_m) = 25\times20/(104.5-20)$).

The parameters (HFP ~25 wt%, T_m ~112°C, ΔH_m ~20 J/g and $W_a\times(D_C/D_A)$ ~5.9) are well within the claimed ranges. The claimed PVDF-HFP is thus disclosed in D1.

It is immediately apparent that the inherent inaccuracy when reading the values from the scales is not large enough to place the data point in question outside of the claimed range.

1.2.1 It is disputed whether the "black dots" at about 25% HFP, representing prior-art examples in Figs 1 and 3 of D1, constitute valid disclosures of PVDF-HFPs.

The respondent argued that these data points appeared neither in the tables of D1 nor in the prior-art documents cited in D1. D1 was therefore inconsistent, and the data disclosed in it could not be used. Moreover, Figs 1 and 3 had to be seen as unconnected disclosures. The HFP content of the black dots in Fig. 1 did also not exactly correspond to the HFP content of the black dots in Figure 3. There was finally no indication that the polymers of the black dots were reproducible because the exact manufacturing procedure was unknown. For this reason alone, the black dots could not be considered part of the prior art.

This is not convincing.

The opposition division correctly held that these figures provide a direct and unambiguous disclosure of such a PVDF-HFP.

The skilled person immediately recognises that Fig. 1 and Fig. 3 show the physical properties of the same PVDF-HFP. This is consistent with Table 1, which relates the HFP wt% to the melting temperature and the melting enthalpy.

The skilled person derives technical information from the entirety of D1, including the graphical representations of data. Figs 1 and 3 in D1 do not have a merely illustrative purpose. They are quantitative graphs representing many data sets of Table 1 (col. 11) by plotting the HFP wt% against the heat of fusion, i.e. the melting enthalpy (Fig. 1) and the melting temperature (Fig. 3). The data sets are explicitly plotted to demonstrate the performance of D1 versus the prior art referred to in D1.

There is nothing to suggest that for prior-art data sets, Fig. 1 showed the melting enthalpy of some PVDF-HFP, while Fig. 3 showed the melting temperature of other PVDF-HFPs with the same HFP content.

The fact that some of D1's inventive examples shown in Fig. 3 do not appear in Fig. 1 cannot call D1's teaching into question.
Moreover, the fact that in D1 the black dot at about 25 wt% HFP is slightly below 25 wt% in Fig. 1 while it is exactly at 25 wt% in Fig. 3 does not detract from that teaching.

This inaccuracy is small, and there is no risk of confusion with other data points. Rather, it appears that it is an artefact due to the quality and production of the figure.

The alleged incomplete representation in Table 1 of data shown in the figures of D1 does not negate the disclosure contained in the figures. The fact that the numerical values of these black dots are not repeated in a table or cannot be traced back to a citation is irrelevant to what D1 discloses to the public.

This graphical disclosure stands on its own as a teaching of a material possessing these properties. Therefore, the disclosure in Figs. 1 and 3 is sufficient to establish that a copolymer with these characteristics was made available to the public by D1.

Irrespective of the question of admittance of this new argument, there is also no indication that the PVDF-HFPs of the black dots were not reproducible. Their properties are consistent with the other prior-art examples. They are not outliers with unreasonable properties. Evidence to the contrary was not provided, and it is - in view of the patent in suit - also not apparent that the production of the claimed PVDF-HFP provided any difficulty for the skilled person.

Auxiliary request 0

2. Consideration and admission, Article 13(2) RPBA

During the oral proceedings before the board, the respondent filed auxiliary request 0, which disclaimed the black dot at about 25 wt% HFP in Figs. 1 and 3

of D1.

They argued that the board's preliminary opinion was surprising and contrary to the opposition division's view. The "black dots" at 25 wt% were not sufficiently disclosed and as such an accidental disclosure. The disclaimer solved the problem of novelty and was allowable in view of G 1/03 and G 2/03.

The objection as to the lack of novelty was first raised in the notice of opposition and maintained throughout the proceedings. In inter partes proceedings before the board, the fact that a board departs from the opposition division's view or changes its own view during the appeal proceedings does not as such constitute exceptional circumstances justifying the submission of new requests.

Moreover, the opposition division acknowledged novelty because it saw a difference in the claimed TMDSC over the DSC measurement of D1. However, it explicitly acknowledged the "black dots" as a stand alone disclosure in the prior art.

Moreover, it is undisputed that D1 belongs to the same technical field. G 1/03 (Headnote 2.1) and G 2/03 (Headnote 2.1) do not permit the exclusion by disclaimer of an anticipation under Article 54(2) EPC originating from the same technical field.

Auxiliary request 0 cannot be considered (Article 13(2) RPBA).

Auxiliary requests A, 1, 2, 3, 5 and 6

3. Novelty, Article 54(1) and (2) EPC

It is immediately apparent that also the subject-matter of claim 1 of these auxiliary requests is anticipated by the prior-art PVDF-HFP with an HFP content of around 25 wt% (see the abscissa in Figs 1 and 3 of D1), which has a melting enthalpy of approximately 20 J/g and a melting point of around 112°C.

The additional features relating to the measurement method and the more restricted ranges do not overcome the lack of novelty of claim 1 of the main request.

Concerning auxiliary request 1, the respondent argued, in addition, that the inclusion of the wording of paragraph [0134] could better specify the wording of claim 1 such that there was no doubt that the reversing heat flow was used in the calculation of D_C.

However, as is apparent from the assessment of novelty of claim 1 of the main request, paragraph [0134] was, in any case, taken into account when interpreting claim 1.

The additional features can therefore not overcome the lack of novelty for the same reasons as those set out for the main request.

Auxiliary requests 4, 7, 8 and 9

4. Amendments, Article 123(2) EPC

The respondent argued that the increase of the lower limit of the range for the term $W_a \times (D_C/D_A)$ to 7.2 (wt%) established novelty over D1. This was clearly disclosed

in Example 3 of the description as filed, meaning that there was no issue with Article 123(2) EPC.

The limit at issue is taken from Example 3, which shows a PVDF-HFP further having an HFP content of 29.1 wt% (W_a) and a melting point of 112°C.

The remaining inventive Examples 1 to 3 have a melting temperature of between 112°C (Example 3) and 116°C (Example 1), which is a very narrow range compared to the claimed range of 105 to 125°C.

It is therefore not apparent why the skilled person would have taken into account the value of 7.2 in isolation from the other properties of the material according to Example 3. It is also not apparent that the selection could be combined with the broad range of the claimed melting temperature.

Therefore, the requirements of Article 123(2) EPC are not fulfilled.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar: The Chair:

C. Vodz R. Winkelhofer

Decision electronically authenticated