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**Datasheet for the decision  
of 26 September 2017**

**Case Number:** T 0969/16 - 3.3.03

**Application Number:** 07870818.7

**Publication Number:** 2069423

**IPC:** C08H5/04

**Language of the proceedings:** EN

**Title of invention:**  
PROCESSING BIOMASS

**Applicant:**  
Xyleco, Inc.

**Relevant legal provisions:**  
EPC Art. 84, 123(2)

**Keyword:**

Clarity - main and auxiliary request (no)  
Amendments - extension beyond the content of the application  
as filed (yes)



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Case Number: T 0969/16 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 26 September 2017**

**Appellant:** Xyleco, Inc.  
(Applicant) 360 Audubon Road  
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**Representative:** von Föner, Nicolai  
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**Decision under appeal:** **Decision of the Examining Division of the European Patent Office posted on 18 November 2015 refusing European patent application No. 07870818.7 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** D. Semino  
**Members:** D. Marquis  
C. Brandt

## Summary of Facts and Submissions

- I. The appeal lies with the decision of the examining division posted on 18 November 2015 to refuse the European patent application n° 07 870 818.7. The decision was based on a main request and auxiliary requests 1-4 filed with letter of 21 July 2015.
- II. In its contested decision, the examining division found *inter alia* that claim 1 of all the requests lacked clarity. It was found that the term "peak maximum molecular weight" had no generally recognised meaning in the prior art and was not defined as such in the application documents. The passage of the description on page 105 defining "peak molecular weight value (Mp)" as the molecular weight that was the most abundant in the molecular weight distribution did not relate to the "peak maximum molecular weight". As a result, "peak maximum molecular weight" was ambiguous and rendered claim 1 unclear.
- III. The applicant (appellant) lodged an appeal against that decision and filed a main request as well as an auxiliary request. The main request corresponded to the auxiliary request 3 filed with letter of 21 July 2015 that was among the requests decided upon by the examining division.

Claim 1 of the main request read:

"1. A composition comprising:  
a cellulosic or lignocellulosic material having a peak maximum molecular weight, as determined by Gel Permeation Chromatography according to the method described in Example 9, of less than 25,000, and a crystallinity of less than 55 percent as determined by

X-ray diffraction according to the method described in Example 10, wherein the material has a bulk density of less than  $0.5 \text{ g/cm}^3$ , wherein the bulk density is determined using ASTM D1895B, and wherein the cellulosic or lignocellulosic material is obtained from sheared paper or paper products, grass or straw."

Claim 1 of the auxiliary request differed from claim 1 of the main request in that the cellulosic or lignocellulosic material was obtained "by radiation and/or sonication."

The appellant also filed with the statement of grounds of appeal a document referred to in this decision as E1 (Daniela Held and Günter Reinhold, Tips and Tricks: GPC/SEC, The Column, October 2007, pages 15-17).

- IV. In a communication sent in preparation of oral proceedings, the Board summarised the points to be dealt with and provided a preliminary view on the disputed issues.
- V. With letter of 21 August 2017, the appellant filed auxiliary request II, of which claim 1 differed from claim 1 of the main request in that the term "peak maximum molecular weight" was replaced by "peak molecular weight" and in that the cellulosic or lignocellulosic material was obtained "by radiation wherein the cellulosic or lignocellulosic material has been sheared to a particle size of 0.79 mm (1/32 inch, 0.03125 inch, 132 mesh), and wherein the radiation has been applied at a total dose between 10 Mrad and 150 Mrad".

Two new documents were also filed

E2: Agilent Technologies, Conventional GPC Polymers and Molecular weight, GPC On Tour, Barcelona, 28th February 2012, pages 1, 13 and 30

E3: Agilent Technologies, Polymer Molecular Weight Distribution and Definitions of MW Averages, 30 April 2015, pages 1-4.

VI. Oral proceedings were held on 26 September 2017.

VII. The arguments provided by the appellant, as far as relevant to the present decision, can be summarised as follows:

Main and auxiliary request

Clarity

The term "peak maximum molecular weight" was *per se* clear in claim 1. It referred to the molecular weight that was the most abundant in the molecular weight distribution of the cellulosic or lignocellulosic material that was also defined as the "peak molecular weight value (Mp)" in the description of the application. In a molecular weight distribution curve wherein, as known, the amount of the material was plotted against the molecular weight, the molecular weight that was most abundant in a molecular weight distribution was per definition the molecular weight at the peak maximum. The skilled person knew that the two terms referred to the same point of the molecular weight distribution and could be therefore used interchangeably.

Similarly, the parameter "Mp" could be found in many other scientific articles, handbooks, text books and the like, as shown by E1-E3. It referred to the

molecular weight at the peak maximum of a molecular weight distribution curve. As the term "peak" per se denoted a maximum, the term "peak molecular weight" was often substituted by "peak maximum molecular weight" as evidenced by document E2. Moreover, as this term was mentioned in connection with the molecular weight measurement via Gel Permeation Chromatography (GPC) in claim 1, specifically according to the method described in Example 9, the person skilled in the art would know that it was a typical molecular weight value determined by GPC. Claim 1 of the main request did therefore not contravene the requirements of Article 84 EPC. The same arguments applied to claim 1 of the auxiliary request.

Auxiliary request II

Amendments

The substitution of "peak maximum molecular weight" by "peak molecular weight" in claim 1 was supported by the description pages 104 und 105. The samples reported in Tables 1 and 2 of example 9 also showed that the peak molecular weight of the materials had to be below 25,000. The amendment of claim 1 was therefore supported by the application as originally filed.

VIII. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request or of the auxiliary request filed with the statement of grounds of appeal, or on the basis of the claims of auxiliary request II filed with the letter of 21 August 2017.

## Reasons for the Decision

Main and auxiliary request

### 1. Clarity

- 1.1 In the main request and auxiliary request filed in appeal, the claimed composition is said to comprise a cellulosic or lignocellulosic material "having a peak maximum molecular weight, as determined by Gel Permeation Chromatography according to the method described in Example 9, of less than 25,000". The term "peak maximum molecular weight" is not defined in claim 1. Without a definition it may be construed by the skilled person as either the highest of the peaks observed on the molecular weight distribution or as the peak of the molecular weight distribution that has the highest molecular weight. Since these two definitions refer to two different points of the molecular weight distribution, claim 1 is per se unclear.
- 1.2 Even an analysis of the whole application as originally filed cannot resolve this unclarity. Indeed the "peak maximum molecular weight" is mentioned in four instances in the application as originally filed, namely twice on page 7 and in claims 112 and 118. A definition of that term is however nowhere provided.
- 1.3 The claimed subject matter was modified in the course of the examining procedure to indicate that the peak maximum molecular weight had to be determined by Gel Permeation Chromatography according to the method described in Example 9. A method of measuring the molecular weight of the claimed cellulosic or lignocellulosic material by Gel Permeation Chromatography is indeed described on pages 103-106 of

the description. Several descriptors used to define the mode of the molecular weight distribution are introduced in that passage. Statistical averages like the "number average molecular weight" (Mn) and the "weight average molecular weight" (Mw) are mentioned on page 104 and the "peak molecular weight value" (Mp) is defined on page 105 as the molecular weight that is most abundant in the distribution. A peak maximum molecular weight is however nowhere mentioned in the passage corresponding to the example 9 referred to in claim 1. Example 9 further contains two tables on page 103 reporting the peaks of the molecular weight distribution of several materials. The data of Table 2 suggest that the molecular weight distribution of materials that are according to current claim 1 (WS132 and SG132) may display multiple peaks. Which of these peaks was seen as the "peak maximum" and which was the most abundant peak cannot be inferred from Example 9. There is therefore in the whole of the application as filed no evidence that the "peak maximum molecular weight" mentioned in claim 1 is identical to the "peak molecular weight value" (Mp) defined in Example 9.

- 1.4 A different conclusion cannot be reached by considering whether an unequivocal meaning was available to the skilled person in view of the common general knowledge. The appellant cited in this respect three prior art documents that would establish that the term "peak maximum molecular weight" was generally known in the art at the priority date of the application and that the terms "peak maximum molecular weight" and "peak molecular weight value" Mp were used interchangeably.
- 1.5 In essence, the three documents filed by the appellant relate to the descriptors Mn, Mw and Mp used to characterize the molecular weight distribution of



polymers as measured by Gel Permeation Chromatography.

- The passage referred to on page 3 of document E3 provides a definition of the peak molecular weight  $M_p$  as "the molecular weight of the highest peak".
- Document E2 discloses the descriptor  $M_p$  that is referred to on page 13 as the molecular weight of the peak maxima and on page 30 as the peak molecular weight.
- Document E1 discloses in the first paragraph of page 16 and the last paragraph of page 17 that the point  $M_p$  is the molar mass at the peak maximum.

The definitions provided in these documents are in accordance with the definition of the "peak molecular weight value"  $M_p$  as found on page 105 of the application since they define  $M_p$  in similar terms as the peak which is the most abundant, the highest peak or the peak maxima of the molecular weight distribution. The documents cited however do not mention the term "peak maximum molecular weight" and therefore cannot establish that "peak maximum molecular weight" and "peak molecular weight value"  $M_p$  were used interchangeably in the prior art. Even after considering the documents cited by the appellant, it is left to the reader to decide what the feature "peak maximum molecular weight" of claim 1 might mean.

- 1.6 In addition, the data provided for some materials in Table 2 of Example 9 shows that depending on the definition chosen for the term "peak maximum molecular weight" the same material may be seen as falling within or outside the scope of claim 1. The material SG132 issued from switchgrass in Table 2 is reported to give rise to three peaks of molecular weights, namely Peak #1 (1,557,360  $\pm$ 83,693), Peak #2 (42,594  $\pm$ 4,414) and

Peak #3 (3268 ±249). The peak representing the highest molecular weight (Peak #3) is outside the claimed range of "less than 25,000". For that reason alone the material SG132 would then not be according to claim 1. The peak representing the molecular weight that is the most abundant is not identified in Table 2. That peak may therefore also be Peak #3, which would then be within the claimed range. In that case, SG132 would be according to claim 1. Even after simultaneous irradiation and sonication, the material (SG132-10-US) retains a peak (Peak #2) within the claimed range and a peak (Peak #1) outside the claimed range. That exemplifies the ambiguity of the term "peak maximum molecular weight" in claim 1 of both the main request and the auxiliary request.

- 1.7 For these reasons, the main request and the auxiliary request lack clarity (Article 84 EPC).

#### Auxiliary request II

### 2. Amendments

- 2.1 Claim 1 of auxiliary request II pertains to a composition comprising a cellulosic or lignocellulosic material having a "peak molecular weight, as determined by Gel Permeation Chromatography according to the method described in Example 9, of less than 25,000 [...]". The appellant found a support for claim 1 in which the reference to "maximum" in "peak maximum molecular weight" was deleted in the definition of the peak molecular weight value (Mp) on page 105 of the application as originally filed.

- 2.2 The passage referred to by the appellant contains a general definition of the peak molecular weight value

(Mp) as a descriptor of the molecular weight distribution, but it does not set out any requirement or limitation of the parameter (Mp) in terms of a numerical range. There is in that passage no disclosure of a cellulosic or lignocellulosic material having a peak molecular weight of less than 25,000. The only instances in the application as originally filed wherein a range of molecular weight of less than 25,000 is mentioned (page 7 and claims 112 and 118) all pertain to the disclosure of the "peak maximum molecular weight" of cellulosic or lignocellulosic materials. In addition, no information can be drawn from the values in table 2, for which it is not even known which of the peaks corresponds to Mp (see point 1.6 above).

- 2.3 It has further not been established by way of common general knowledge that the terms "peak maximum molecular weight" and "peak molecular weight" could be used interchangeably (see points 1.3 to 1.5, above).
- 2.4 The amendment of "peak maximum molecular weight" into "peak molecular weight" is therefore not supported by the application as originally filed. It follows that claim 1 of the auxiliary request II does not fulfill the requirements of Article 123(2) EPC.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



P. Martorana

D. Semino

Decision electronically authenticated