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**D E C I S I O N**  
**of 10 December 2002**

**Case Number:** T 0978/98 - 3.4.2

**Application Number:** 93113632.9

**Publication Number:** 0589229

**IPC:** H01M 10/40

**Language of the proceedings:** EN

**Title of invention:**

Organic electrolytic solution and organic electrolytic  
solution cell

**Patentee:**

Hitachi Maxell Ltd.

**Opponent:**

-

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56, 123(2)

**Keyword:**

"Added subject matter - no (after amendment)"

"Inventive step - yes"

**Decisions cited:**

-

**Catchword:**

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Case Number: T 0978/98 - 3.4.2

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.2  
of 10 December 2002

**Appellant:** Hitachi Maxell Ltd.  
1-88, Ushitora-1-chome  
Ibaraki-shi  
Osaka-fu (JP)

**Representative:** Jönsson, Hans-Peter, Dr. Dipl.-Chem.  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 11 May 1998  
refusing European patent application  
No. 93 113 632.9 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** E. Turrini  
**Members:** M. A. Rayner  
B. J. Schachemann

## Summary of Facts and Submissions

I. The present appeal lies against the decision of the examining division to refuse European patent application No. 93 113 632.9 (publication No. EP-A-0589229). The application relates to an organic electrolytic solution cell.

II. During the proceedings before the first instance the following documents, inter alia, were considered:

D1 : WO-A-8803331

D2 : EP-A-0486704.

The examining division found that claim 1 before it complied neither with Article 123(2) EPC nor Article 84 EPC, respectively. In both cases the division referred to the term "steric hindrance barrier" in the claim. The division considered with respect to Article 56 EPC, inter alia, that since no effect resulting from a lead member of aluminium could be identified, the subject matter of claim 1 constituted an arbitrary modification of the disclosure of closest prior art document D1 devoid of an inventive step.

III. During the appeal proceedings, the board issued a communication observing, inter alia, that the claims before it omitted the term "steric hindrance barrier".

IV. The case of the appellant can be summarised as follows:

**Requests**

Grant of a patent on the basis of the application documents specified in the letter dated 9 July 2002, filed responsive to the communication of the board.

Oral proceedings, this request to be cancelled if the board agreed with the request for grant.

**Arguments**

The application addresses the problem of the deterioration of the shelf stability of a cell comprising a positive current collector and a lead member, both made of aluminium, due to the dissolution of aluminium in the electrolytic solution of the cell at a relatively high voltage of 3.1 V or larger. The prior art documents neither address the influence of the dissolution of the metal of the current collector and the lead member on the shelf stability of the cell, nor suggest the specific claimed cell arrangement.

V. The sole independent claim according to the request of the appellant, is worded as follows:

" 1. An organic electrolytic solution cell comprising a positive electrode (1), a negative electrode (2), and an organic electrolytic solution (4) comprising an organic solvent and a metal salt, the cell having a cell voltage of at least 3.1 V and the positive electrode comprising a positive current collector having a positive lead member (14) both made of aluminium, wherein a part of said lead member is in

contact with said electrolytic solution and said metal salt is an organic metal salt, selected from the group consisting of:  $(CF_3SO_2)_2N.ME$ ,  $(CF_3SO_2)_3C.ME$ ,  $(C_6H_4F)_4B.ME$ ,  $(C_6H_4Cl)_4B.ME$ , wherein ME is Li, Na or K;  $C_nF_{2n+1}SO_3Li$  wherein n is an integer of at least 2,  $LiB[C_6H_4(CF_3)]_4$ ,  $LiB[C_6H_3(CF_3)_2]_4$ , and  $LiB(C_6H_3A_2)_4$  wherein A is a group of the formula:  $-C(CF_3)_2OCH_3$ ."

### Reasons for the Decision

- 1.1 The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

#### *Admissibility of amendments (Article 123(2) EPC)*

- 2.1 Claim 1 derives from independent claim 8 as originally filed. In amended claim 1 the metal salt is specified as an organic metal salt selected from specific salts disclosed in the original application as satisfying conditions according to original claim 8 (see claims 1 and 3 and page 2, line 22 to page 4, line 6 together with page 4, lines 12 to 22 of the original application). An aluminium collector and lead member with part thereof in contact with the electrolyte is supported by original claim 9; page 7, lines 1 to 4; page 11, line 10 to page 12, line 11 and page 16, line 14. The remaining features of the amended claim 1 as well as those amended in the dependent claims do not extend beyond the disclosure of the documents as originally filed. The same conclusion applies to amendments effected to the description and claims consequent to Rules 27(1)(b)(c) and 29(7) EPC, respectively.

- 2.2 Accordingly, the amended application documents satisfy the requirements of Article 123(2) EPC.

*Prior art*

- 3.1 Document D1 discloses electrolytic solutions for electrolytic cells comprising an organic solvent and a metal salt. The document mentions a test voltage of 4 volts (page 2, lines 16 to 21). In Example 2 the cell comprises a negative electrode and a positive electrode including a collector of aluminium. In the example the metal salt is said to be  $\text{Li}(\text{CF}_3\text{SO}_2)\text{N}$ . The board observes that it is in fact apparent from the valence of the elements, the stoichiometric symmetry of the salts (see claim 1 of D1) and the salts indicated in Examples 1 and 6 to 10 of the document, that the salt of Example 2 corresponds to  $\text{Li}(\text{CF}_3\text{SO}_2)_2\text{N}$ .

- 3.2 Document D2 discloses an organic electrolytic battery comprising an electrolytic solution of an organic solvent and an organic metal salt. In Example 1 (see page 5, lines 3 to 38) the salt is  $\text{LiC}_4\text{F}_9\text{SO}_3$  and the positive electrode of the battery comprises a current collector having a lead member attached thereto by spot welding. The collector is of stainless steel and the lead member is of an unspecified material.

*Novelty (Article 54 EPC)*

- 4.1 Neither document D1 nor document D2 discloses a lead member connected to the positive current collector, both of aluminium. Moreover, none of the remaining available documents comes closer to the subject matter of claim 1 than document D1 or D2.

4.2 Accordingly, the subject matter of claim 1 is new over any one of the available documents (Articles 52(1) and 54 EPC).

*Inventive step (Article 56 EPC)*

5.1 As document D1 deals with the stability of the cell at high voltages (D1, page 2, lines 16 to 21), and discloses one of the claimed salts and the use of a positive current collector of aluminium, the board concurs with the examining division in considering it the closest prior art. According to the disclosure of the original application, the shelf stability of the cell at high voltages is improved by the selection of aluminium as the material of the positive current collector (page 6, middle paragraph to page 7, line 4 and page 10, line 9 to page 11, line 9). This same effect is achieved for the lead member of aluminium disclosed as a tab part of the collector in partial contact with the solution (page 11, last paragraph and page 12, first paragraph together with page 16, fourth paragraph and Figure 1). The problem solved by the subject matter of claim 1 is therefore that of further enhancing stability.

5.2 Even if it were assumed that the man skilled in the art seeking to implement the disclosure of document D1 in a real cell could have considered a cell of the kind requiring the provision of a lead member coupled to the positive collector as disclosed for instance in document D2, there is no suggestion in the prior art towards using a lead member of the same material as the current collector, let alone a lead member of aluminium. In particular, in document D2, the only document disclosing the provision of a positive current

collector having a lead member, the lead member is a member of unspecified material attached by spot welding to the corresponding collector of stainless steel.

5.3 The prior art documents are moreover silent as to any technical effect of the material of the lead member of a current collector in relation to shelf stability of the cell. Document D2, in particular, teaches improving the cell storage stability in terms of the components of the electrolytic solution (page 3, lines 35 to 40 and page 4, lines 11 to 16 and 33 to 38) and also teaches preventing corrosion of the positive current collector material by using austenitic stainless steel or titanium as a metal part of the current collector (D2, page 4, lines 39 to 42), but is silent as to any technical effect associated with the material of the lead member (page 5, lines 9 to 11 and 35 to 38).

5.4 Accordingly, the subject matter of claim 1 cannot be reached in an obvious way from the prior art available and is thus considered to involve an inventive step (Articles 52(1) and 56 EPC). The same conclusion applies to claims 2 to 8 by virtue of their dependence.

*Oral proceedings*

6. Oral proceedings are not necessary as the positive view of the board meets the condition for withdrawal of the request therefor.

*Further procedure*

7. The board has thus convinced itself that the patent application satisfies the requirements of the EPC. The board observes, in particular, that objections of the



examining division under Articles 123(2) and 84 EPC in relation to the term "steric hindrance barrier" no longer exist. In accordance with Article 111(1) EPC, the board thus considers it appropriate to exercise the power of the examining division to order the grant of a patent.

## Order

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

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to grant a patent on the basis of
  - claims 1 to 8 filed with the letter of 9 July 2002,
  - description pages 1, 1a, 2 to 7, 10 and 11 filed with the letter of 9 July 2002 and pages 8, 9 and 12 to 18 as originally filed, and
  - drawing sheets 1/2 and 2/2 as originally filed.

The Registrar:

The Chairman:

P. Martorana

E. Turrini