Europäisches Patentamt
Beschwerdekammern

European Patent Office
Boards of Appeal

Office européen des brevets
Chambres de recours

Veröffentlichung im Amtsblatt	Ja/Nein
Publication in the Official Journal	Yes/No
Publication au Journal Officiel	Oui/Non

Aktenzeichen / Case Number / N° du recours : T 672/89 - 3.4.1

Anmeldenummer / Filing No / N° de la demande : 83 306 089.0

Veröffentlichungs-Nr. / Publication No / N° de la publication : 0 115 119

Bezeichnung der Erfindung:
Title of invention:
Titre de l'invention : Shaped field magnetron electrode

Klassifikation / Classification / Classement : H01J 37/34

ENTSCHEIDUNG / DECISION

vom / of / du 7 November 1990

Anmelder / Applicant / Demandeur : Materials Research Corporation

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 123(2)

Schlagwort / Keyword / Mot clé : "Support from the application as filed (yes)"

Leitsatz / Headnote / Sommaire

Europäisches Patentamt
Beschwerdekammern

European Patent Office
Boards of Appeal

Office européen des brevets
Chambres de recours

Case Number : T 672/89 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 7 November 1990

Appellant : Materials Research Corporation
Route 303
Orangeburg
New York 10962 (USA)

Representative : Moon, Donald Keith
Brewer & Son
Quality House, Quality Court
Chancery Lane
London WC2A 1HT (UK)

Decision under appeal : Decision of Examining Division 047 of the European Patent Office dated 19 May 1989 refusing European patent application No.83 306 089.0 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : K. Lederer
Members : Y.J.F. van Henden
L. Mancini

Summary of Facts and Submissions

I. European patent application 83 306 089.0 (publication number 0 0115 119) was refused by decision of the Examining Division in respect of Claim 1 filed on 13 May 1988.

II. The reason given for the refusal was that Claim 1, received with Appellant's letter of 11 May 1988, contained subject-matter extending beyond the content of the application as filed and thus offended against Article 123(2) EPC.

III. The Appellant lodged an appeal against the decision. With his Statement of Grounds of Appeal, he submitted two alternative versions of Claim 1 forming the basis of first and second auxiliary requests.

IV. In a communication pursuant to Article 110(2) EPC, the rapporteur of the Board supported the views of the Examining Division.

V. Subsequent to the communication of the rapporteur and to consultations by telephone, the Appellant filed on 3 October 1990 a new page 10 of description and, on 8 October 1990, a new set of claims numbered 1 through 14 and, to replace page 7 of the application, new pages of description numbered 7, 7a, 7b. With letter of 22 October 1990, he gave his agreement to amendments to be performed in page 7a of description and in Claims 3, 8 and 13.

VI. Claims 1 and 14 of the new set are independent ones and read:

1. A magnetron electrode apparatus for use as a substrate support electrode in a low pressure chamber of a plasma processing device, the magnetron electrode apparatus comprising:

an electrode body (31) having a flat rectangular processing surface (26) with a length defined between first and second ends of the body and width defined between two side edges of the surface;

first magnetic means (34) including first and second magnetic members (35,36) disposed at the first and second ends of the electrode body, respectively, the first magnetic member constituting a first magnetic pole of one polarity and the second magnetic member constituting a second magnetic pole of opposite polarity, thereby to provide a first magnetic field having field lines which extend between the first and second magnetic poles in the form of a continuous belt encircling the body (31) in a direction perpendicular to its length;

characterised by:

auxiliary field-shaping magnetic means (48,56) having third and fourth magnetic poles (49, 50, 57, 58) which are disposed close to and are of the same polarity as the first and second magnetic poles and which produce an auxiliary magnetic field which flattens the field lines of the first magnetic field extending between the first and second magnetic poles and concentrates the flux of the first magnetic field closely adjacent to the processing surface (26).

14. A plasma processing apparatus including an evacuable chamber, said apparatus being characterised by:

means (16) for evacuating the chamber;

means (21) for introducing a gas into the chamber;

a cathode (43) having a sputtering surface;

a magnetron electron apparatus (24) according to any of Claims 1 to 13 for supporting a substrate (27) on said processing surface (26); and

a power supply (28) connected to the cathode (43) and the electrode apparatus (24) for delivering electrical energy to the cathode (43) at a first predetermined voltage appropriate for causing sputtering from said sputtering surface and for delivering electrical energy to the electrode (24) at a second predetermined voltage appropriate for causing ionization of the gas adjacent to the processing surface (26).

Claim 3 is independent too. With the amendments agreed to in Appellant's letter of 22 October 1990, its wording differs from that of Claim 1 in that the second paragraph of the precharacterising clause is replaced by "an electrode body (31) having a flat processing surface (26), a length defined between first and second ends, a width defined between two parallel sides extending normally to the processing surface, and a thickness which is substantially less than said length and width of the electrode body;" and in that its characterising part ends with the additional clause "; and the ends of the electrode body being non parallel".

The remaining Claims 2, 4-13 are all dependent.

VII. The Appellant requests further prosecution of the case on the basis of the following documents:

description, pages 2-4, 6, 8, 9, 12-14, 16-20 of the published patent application;
pages 1, 5, 5a, 11, 11a, 15, 15a filed on 13 May 1988;
page 10 filed on 3 October 1990;
pages 7, 7a, 7b filed on 10 October 1990;

Claims 1-14 filed on 10 October 1990;

drawings, sheets 1/3-3/3 as published,

with the amendments to page 7a and Claims 3, 8 and 13 requested in his letter of 22 October 1990.

Reasons for the Decision

1. The appeal is admissible.

2. Claim 1.

2.1 With respect to that of Claim 6 in the published patent application, the wording of Claim 1 exhibits the following differences:

(a) the electrode apparatus is said to be provided "for use as a substrate support electrode";

(b) the mention of a "magnetic field extending between the first and second magnetic poles" is replaced by that of "a first magnetic field having field lines which extend between the first and second magnetic poles in

the form of a continuous belt encircling the body (31) in a direction perpendicular to its length", and

(c) the mention of "third and fourth magnetic poles disposed in spaced relation to the first and second magnetic poles respectively, the third magnetic pole having the same polarity as the first one and the fourth magnetic pole having the same polarity as the second one" is replaced by that of "third and fourth magnetic poles disposed close to and of the same polarity as the first and second magnetic poles, which third and fourth poles produce an auxiliary magnetic field which flattens the field lines of the first magnetic field extending between the first and second poles and concentrates the flux of the first field closely adjacent to the processing surface".

2.2 The description as originally filed states that "Fig. 1 illustrates ... a plasma processing apparatus (10) incorporating a substrate support electrode according to the invention" - cf. page 8, lines 23 to 25 of the published patent application. So, no objection may be raised as regards amendment (a) referred to in above section 2.1 of the present decision.

Support to amendment (b) is given by Figures 1 and 2 of the drawings and by page 12 of the published patent application, lines 18 to 23 - cf. "magnetic belt which extends around the periphery of the electrode".

Support to amendment (c) is given by Figure 3 and 4, by page 15, line 32 where the bar magnets 49, 50 are said to be positioned "adjacent", i.e. to the first magnet, and by page 16, line 16 to page 17, line 4, where the flattening effect of the auxiliary magnetic field is explained.

On page 16 of the application, lines 21 to 24, it is stated that the bulge of the magnetic field produced by the auxiliary magnet (48) flattens the bulge of the field (38), i.e. that extending between the magnetic members (35, 36). Referring to this effect in Claim 1 makes implicitly clear that each of the third and fourth magnetic poles has the same polarity as the neighbouring pole of the first magnetic means (34), and that the field lines of the flux produced by the field shaping means are more remote from the processing surface (26) than those extending between the first and second magnetic members (35,36). It is indeed obvious that no flattening would be achieved if the last condition were not met and that the bulge of field (48) would be aggravated if the neighbouring poles were of opposite polarity.

2.3 The Board is thus satisfied that Claim 1 meets the requirements of Article 123(2) EPC.

3. Claim 3

The reason for drafting Claim 3 as an independent one is that no variation of the processing surface width was envisaged in the application as filed. Having regard to the disclosure on page 19 of the published patent application, lines 1 to 29, the Board does not raise objections against Claim 3 either on the basis of Article 123(2) EPC.

4. Claims 2 and 4-13

These new claims respectively correspond to Claims 10, 7, 8, 9, 12, 3, 13, 15, 16, 14 and 5 of the published patent application. Despite a few minor differences regarding their dependence, the Board has no objection against said new claims in relation with Article 123(2) EPC. It is indeed considered that the dependence of the original

claims introduced unnecessary restrictions of the protection they conferred.

5. Claim 14

The feature in Claim 1 objected to by the Examining Division, i.e. the choice of the second voltage such that there is no significant sputtering on the support surface, having been deleted, a plasma processing apparatus of the kind covered by the corresponding new Claim 14 is described in the published patent application -see Figures 1-3 and from page 8, line 23 to page 11, line 14. Such being the case here, the Board does not object to Claim 14 on the basis of Article 123(2) EPC.

6. The amendment to the description requested by the Appellant is consistent with that of Claim 3. No objection, therefore, can be raised against this amendment in pursuance of Article 123(2) EPC.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division for further prosecution on the basis of the documents listed in section VII of the present decision with the following amendments:

page 7a, lines 13 to 16, replacement of the existing text by "an electrode body having a flat processing surface, a length defined between first and second ends, a width defined between two parallel sides extending normally to

the processing surface, and a thickness which is substantially less than said length and width of the electrode body;"

Claim 3, replacement of the second paragraph, commencing on line 3 of page 22, by the text mentioned above in relation with page 7a, lines 13 to 16, with the further insertion of reference (31) after "an electrode body" and reference (26) after "a flat processing surface";

Claim 8, replacement of the precharacterising clause by "a magnetron electron apparatus as claimed in Claim 1 or any of Claims 4-7 as appendant to Claim 1";

Claim 13, third line, replacement of reference (39) by (39,41).

The Registrar: The Chairman:

P. Martorana K. Lederer