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D E C I S I O N
of 14 April 2003

Case Number: T 0357/01 - 3.4.3

Application Number: 93303937.2

Publication Number: 0573183

IPC: H01L 21/00

Language of the proceedings: EN

Title of invention:

Probe station with integrated environment control enclosure

Patentee:

CASCADE MICROTECH, INC.

Opponent:

SUSS MircroTec Text Systems GmbH
Erich Reitinger-Systementwicklung und forschung für die
Halbleiterindustrie

Headword:

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Relevant legal provisions:

EPC Art. 52(1), 54, 56, 100, 102(3)

Keyword:

"Subject-matter going beyond the content of the application as
filed (no)"

"Inventive step (yes)"

Decisions cited:

G 0008/91

Catchword:

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Case Number: T 0357/01 - 3.4.3

D E C I S I O N
of the Technical Board of Appeal 3.4.3
of 14 April 2003

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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
27 February 2001 concerning maintenance of
European patent No. 0573183 in amended form.

Composition of the Board:

Chairman: R. K. Shukla
Members: E. Wolff
M. J. Vogel

Summary of Facts and Submissions

I. This is an appeal from an interlocutory decision of the opposition division, dispatched on 27 February 2001, to maintain European Patent No. 0 280 812 in amended form pursuant to Article 102(3) EPC.

II. Independent claim 1 of the patent as granted reads as follows:

"1. A probe station comprising a substantially planar surface (82) for holding a test device on said surface (82), a holder (28) for an electric probe (30) for contacting the test device, and a pair of positioning mechanisms (16, 24) for selectively moving both said surface (82) and said holder (28), independently of each other, toward or away from the other, characterized by a compact enclosure (12, 42, 44) surrounding said surface (82) and providing a controlled environment, the integrity of which can be maintained despite movement by said positioning mechanisms (16, 24) of each one of said surface (82) and holder (28), respectively, toward or away from the other along an axis of approach, each one of said pair of positioning mechanisms (16, 24) being located at least partially outside of said enclosure (12, 42, 44) and extending between the exterior and interior of the disclosure (12, 42, 44)."

Claim 17 relates to the use of a probe station as claimed in any one of the preceding claims to probe a test device.

III. The patent was opposed by:

Opponent 1: Karl Suess Dresden GmbH, Sacka, Germany, and

Opponent 2: Eric Reitinger - Systementwicklung und
Forschung für die Halbleiterindustrie,
Germering, Germany

Opponent 1 relied on the grounds for opposition set out
Article 100(a) EPC in combination with Articles 52(1),
54 and 56 EPC, citing the following documents

O2: EP-A-0 505 981

O6: Prior use of PM8, Anlagen E1-E4

Opponent 2 relied on the grounds for opposition set out
in Article 100(a) EPC in combination with
Articles 52(1), 54 and 56 EPC and on the ground set out
in Article 100(c) EPC in combination with
Article 123(2) and (3) EPC. Opponent 2 cited the
following documents:

O1: US-A-3 333 274

O2: EP-0 505 981 B1

O3: IEEE Transactions on Instrumentation and
Measurement, vol. 38, No. 6, December 1989, New
York US, pages 1088 - 1093, Yousouke Yamamoto 'A
COMPACT SELF SHIELDING PROBER FOR ACCURATE
MEASUREMENT OF ON-WAFER ELECTRON DEVICES"

O4: JP-A-2 220 453 and English translation

05: DE-A-31 14 466 A1

Opponent 2 also alleged that the subject matter of claims 1 and 17 of the patent as granted extends beyond the content of the application as originally filed.

IV. The independent claim 1 proposed for maintenance in the decision under appeal reads as follows:

1. A probe station comprising a substantially planar surface (82) for holding a test device on said surface (82),

a holder (28) for an electric probe (30) for contacting the test device, and

a pair of positioning mechanisms (16, 24) for selectively moving both said surface (82) and said holder (28), independently of each other, toward or away from the other,

one of said positioning mechanisms providing X-Y movement of said surface

a compact enclosure (12, 42, 44) surrounding said surface (82) and providing a controlled environment, the integrity of which can be maintained despite movement by said positioning mechanisms (16, 24) of each one of said surface (82) and holder (28), respectively, toward or away from the other along an axis of approach in the Z-direction and despite said X-Y movement of said surface which movement is within the enclosure;

each one of said pair of positioning mechanisms (16,24) being located at least partially outside of said enclosure (12, 42, 44) and extending between the exterior and interior of the enclosure (12, 42, 44), said enclosure (12, 42, 44) including an upper section (42) having a plate extending laterally above said surface (82) and a sidewall fixed to said plate and surrounding the surface laterally."

Claim 17 relating to the use of a probe station has the same wording as claim 17 as granted.

V. Appellant 1 (Opponent 1) filed a notice of appeal against the interlocutory decision of the opposition division on 25 April 2001 and paid the appeal fee on the same day. The statement setting out the grounds of appeal was filed on 27 June 2001.

VI. Appellant 2 (Opponent 2) filed a notice of appeal against the interlocutory decision of the opposition division on 19 March 2001, and paid the appeal fee on the same day. The statement setting out the grounds of appeal was filed on 26 June 2001 together with the following new prior art documents

07 US-A-4,926,118

08 US-A-5,097,207

The respondent (patent proprietor) filed a reply to both appeals on 15 October 2001, objecting to the late submission of documents 07 and 08 and asking for an award of costs against appellant 2 in view of their late submission, and requesting oral proceedings in the

event that the appeals could not be dismissed in the course of the written procedure.

- VII. In response to a communication annexed to the summons to oral proceedings, the respondent filed a new main request on 10 March 2003, together with four auxiliary requests. The main request is that both the appeals be dismissed, and the patent be maintained as proposed in the decision under appeal. On 8 April 2003 appellant 1 withdrew his request for oral proceedings, and also on 8 April, appellant 2 withdrew his appeal and any additional material provided in the course of the appeal proceedings. After careful consideration of the issues to be decided, the Board cancelled the oral proceedings and by telefax informed the parties accordingly.
- VIII. The arguments presented by the sole remaining appellant, appellant 1, can be summarised as follows:

Claims 1 and 17 of the patent in the form in which they were proposed for maintenance by the opposition division, i.e. the main request before the Board, are admittedly new. However, claim 1 lacks an inventive step over documents O4 and O5 which between them show all the features of claim 1, thereby also rendering the use claim 17 obvious.

Secondly, the change in wording of claim 1 from requiring a seal, as in the originally filed claim 1, to specifying a controlled environment as in the claim as granted, is an extension of subject matter beyond the contents of the application as filed, contrary to Article 123(2) EPC.

Thirdly, the addition, at the end of claim 1 of the reference to "the enclosure including an upper section having a plate extending laterally above that surface and a sidewall surrounding that surface laterally" constitutes an impermissible extension of the subject matter covered by the claim, contrary to Article 123(3) EPC.

Documents 07 and 08 are submitted in response the maintenance of the patent on the basis of the claims of the patent proprietor's auxiliary request. These documents are prima facie relevant as putting in doubt the validity of the claims according to the auxiliary request.

IX. The respondent's arguments can be summarised as follows.

According to appellant 1, the difference between the disclosure in document 04 and the invention as claimed in claim 1 is that in the latter the sidewall is rigidly fixed to the plate and that despite movement of the wafer support surface in the x-, y- and z-direction, a controlled environment is achieved around the surface.

Considering the technical content of document 05, the skilled person would not consider this a relevant disclosure because it relates to ion implantation chambers which work under vacuum. However, even if the skilled person were to consider document D5 as being relevant, it would require an inventive selection to identify those technical features of document 05 which

should be applied to the apparatus of document 04 to arrive at the claimed subject matter.

As regards the change of wording from "maintaining a seal" to "providing a controlled environment the integrity of which can be maintained", the term seal was used extremely loosely in the application and it is clear from the originally filed description as a whole that the subject matter described is an environmental enclosure providing a controlled environment.

The allegation that it cannot be deduced from the drawings that the sidewall attached to the plate surrounds the surface is also to be rejected in view of the contents of Figures 1 to 3, which between them clearly show that there is a sidewall which surrounds the surface.

The late submission of documents 07 and 08 is objected to. Document 07 is not relevant because it does not relate to apparatus for testing semiconductor wafers. Document 08 relates to a semiconductor tester which does not have a built-in controlled environment enclosure. In view of the late submission of documents 07 and 08, an award of costs is requested against appellant 2.

Reasons for the Decision

1. The appeal is admissible.

2. Procedural considerations

2.1 Appellant 1 did not withdraw his appeal but merely indicated that he did not intend to be represented at the oral proceedings so that the appeal proceedings remain pending before the Board (G 08/91). Although by withdrawing its appeal the appellant 2 ceased to be an appellant, he nonetheless remains party to the appeal proceedings as of right, according to Article 107 EPC.

2.2 As long as the appeal proceedings are pending, the Board is under a duty to examine all the facts, evidence and arguments provided by a party (Article 114(1) EPC). It follows that, in the absence of any provisions in the EPC which would allow documents or arguments once presented to be withdrawn again, the Board is obliged to examine documents 07 and 08, and the arguments made by the erstwhile appellant 2 before the withdrawal of his appeal. Only if these documents were to be considered not to have been submitted in due time could they be disregarded by the Board. (Article 114(2) EPC).

2.3 In the present case, documents 07 and 08 were filed in response to the patent having been maintained in amended form on the basis of the claims of the auxiliary request. Consequently, they cannot be considered to have been submitted late, and the Board is obliged to examine documents 07 and 08 and their possible relevance. Moreover, the request for costs against the appellant 2 must also fail for these reasons.

3. *Amendments*

3.1 Appellant 1 submitted that independent claim 1 as granted is unjustifiably broader than claim 1 as originally filed (statement of grounds, page 4, point 2.1) on account of the change in the wording of claim 1 from maintaining a seal to providing a controlled environment. This reference to a controlled environment is repeated in claim 1 of the main request.

3.1.1 As opponent, appellant 1 had not relied on the ground for opposition under Article 100(c) EPC during the opposition proceedings. Only appellant 2 as opponent had relied upon this ground for opposition. Despite the withdrawal of the appeal by appellant 2, reliance by appellant 1 on Article 100(c) EPC in respect of the above amendments does not introduce a ground of opposition which could be considered new since the ground under Article 100(c) was part of the proceedings before the opposition division.

3.1.2 However, as argued by the respondent, it is clear from the description that the enclosure is intended to provide a controlled environment and that the term seal was used rather loosely as shown, e.g., by the reference in column 2 of the granted patent to the sealing provided by the enclosure in the preferred embodiment being effective with respect to all three major environmental influences, i.e., EMI, substantial air leakage, and light. The Board is therefore satisfied that the change concerned in the wording of the claim does not introduce subject matter going beyond the content of the application as filed.

3.2 Appellant 1 submitted that the phrase "that enclosure including an upper section having a plate extending laterally above that surface and a sidewall fixed to the plate and surrounding that surface laterally" in claim 1 goes beyond the disclosure of the application as originally filed. Although a sidewall was shown in the drawings, it was not clear from the drawings that, in view of the hinged steel door (68) shown in Figure 1, the sidewall fixed to the plate actually surrounded the surface as required by the claim.

3.2.1 The Board is nevertheless persuaded by the respondent's argument that Figure 3 shows that the top plate (42) has depending sidewalls and that these sidewalls extend below the level of the chuck. As shown in Figure 2, the sidewall extends all the way round. The presence of a region in the plate and the sidewall which include the door does not alter the fact that the sidewall surrounds the plate, especially as the wall extends without interruption below the downward projecting part of the door. Interpreting "the sidewall fixed to said plate" in a manner which is consistent with the disclosure as meaning that the sidewall is fixed with respect to the plate and not that it is attached to the plate, the Board is satisfied that the drawings, which were part of the application as originally filed, disclose the features as claimed.

3.3 The Board concludes for the foregoing reasons that the subject matter of claim 1 was contained in the application as originally filed and that therefore claim 1 complies with the requirements of Article 123(2) EPC.

4. *Clarity*

The clarity of the amendments made in the course of the opposition proceedings was not disputed by appellant 1. The Board is also satisfied that the amended claim is clear.

5. *Novelty and inventive step*

5.1 The novelty of the invention claimed in independent claim 1 of the main request was acknowledged by appellant 1.

5.2 Document 04 discloses in the embodiments of Figures 1 and 8 a probe station provided with a wafer support surface and a probe holder. It possesses most of the features of the invention claimed in claim 1, the differences being that, as already set out by the opposition division (page 11, last paragraph of its decision), in the claimed invention the positioning mechanism for the probe holder specifically allows the holder to be moved along the axis of approach between holder and wafer support surface along the z-direction, document 04 being not specific enough in this respect, and in that in document 04 the sidewall moves with the support surface relative to the plate in the x- and y-direction while in the claimed invention the sidewall is fixed to the plate.

5.3 The objective technical problem addressed by the invention is therefore to provide a probe station having a controlled environment in an enclosure of relatively small size while still allowing the probes

and the wafer support to be moved in the x-, y- and z directions.

- 5.4 The solution adopted by the invention as claimed in claim 1 is to provide a compact enclosure in which the sidewalls are fixed with respect to the plate covering the enclosure and in which the surface is capable of movement in the x-, y- and z-directions within the enclosure such that the surface and the holder can be moved independently of each other along the axis of approach in the z-direction.
- 5.5 Appellant 1 contended that the skilled person would have readily arrived at the solution adopted by the claimed invention with the aid of the teaching in document 05 which relates to a system for rotating a wafer-loaded disc supported in an evacuated chamber of an ion implantation system. The document relates to semiconductor manufacturing, that is to the same field of technology as the claimed invention and would therefore be considered by the skilled person to be relevant to the solution of the stated problem. Relying in particular on Figure 3 of document 05 and the associated description on page 8, first paragraph, the appellant alleged that the wafer-loaded disc was mounted in an enclosure with fixed sidewalls so as to be rotatable and movable in the x-, y- and z-direction with a plate extending across and projecting laterally beyond the surface of the disc, and a sidewall surrounding the surface of the disc.
- 5.6 The Board, however, agrees with the respondent's view that there is no indication in document 05 that it is the feature of using fixed sidewalls that would need to

be transferred to the apparatus of document 04. More importantly, as the opposition division stated in its decision (page 12, second paragraph), it is not possible to fix the sidewall to the plate in document 04 since this would render the x-y movement of the surface (6) impossible. Appellant 1 alleged that there is a reference in document 05 to movement in the x- y- and z-direction. The Board cannot agree. Although there is a reference to up and down movement in document 05, (not on page, 8 first paragraph of as stated by appellant 1, but on page 9, second paragraph as well as in related passages at the end of the second paragraph of page 11 and in the paragraph bridging pages 11 and 12), this movement is, in the terms of claim 1 of the patent in suit, movement in the x- and y-directions. The reference to up and down movement stems merely from the fact that in the drawing of Figure 3 and, for that matter, in Figure 2, the wafer support surface of the disc (2) is drawn vertically and the axis about which the disc rotates, horizontally. There is thus no mention in document 05 of any movement of the wafer support surface in that direction which claim 1 of the patent refers to as "the axis of approach in the z-direction". In the absence of any knowledge of the invention it is not clear how the teaching of document 05 could be combined with the teaching of document 04 such that movement of the surface in the x-, y- and z-direction could be achieved within the enclosure. The Board therefore concludes that the invention claimed in claim 1 is not obvious over the disclosures in documents 04 and 05.

- 5.7 Having considered the contents of documents 07 and 08 and the arguments submitted by the erstwhile appellant 2 and the respondent, the Board is persuaded by the arguments submitted by the respondent against the combination of document 01 and either document 07 or 08 making the claimed invention obvious.
- 5.7.1 Document 01 relates to a semiconductor wafer tester which has no environmental enclosure. It has a table which can be displaced to enable access to anyone of the integrated circuits on the wafer.
- 5.7.2 The Board accepts the respondent's argument that the skilled person would not consider document 07 as relevant because it relates to a three-chamber testing station for large arrays of fully packaged chips, using probe cards for making contact. There are no probe manipulators, the problems to be faced when testing arrays of finished chips are quite different from those encountered in testing circuits while they are still on the wafer, and picking only certain features of the apparatus in document 07 is not permissible. Documents 01 and 07 therefore cannot be combined in a manner which makes the claimed invention obvious.
- 5.7.3 Regarding document 08, the Board agrees with the respondent that the document relates to a semiconductor tester which does not have a built-in controlled environment enclosure, and that the dashed line in Figure 1 represents at best a box surrounding the entire apparatus, but not an environmental enclosure of the type defined in claim 1. Combining documents 01 and 08 would not therefore result in an arrangement as claimed in claim 1 of the patent in suit.

5.8 For the reasons given, claim 1 of the main request complies in the judgment of the Board with the requirements of Articles 52(1), 54 and 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

D. Spigarelli

R. K. Shukla