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**Datasheet for the decision  
of 9 January 2008**

**Case Number:** T 0564/05 - 3.4.03

**Application Number:** 96936061.9

**Publication Number:** 0852808

**IPC:** H01L 21/68

**Language of the proceedings:** EN

**Title of invention:**

Electrostatic clamping method and apparatus for dielectric workpieces in vacuum processors

**Applicant:**

LAM RESEARCH CORPORATION

**Opponent:**

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**Headword:**

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**Relevant legal provisions:**

EPC Art. 52(1), 56

**Relevant legal provisions (EPC 1973):**

EPC Art. 52(1), 56

**Keyword:**

"Inventive step (no)"

"Remittal to examining division (no)"

**Decisions cited:**

G 0010/93

**Catchword:**

See reasons 3 and 4



Case Number: T 0564/05 - 3.4.03

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.03  
of 9 January 2008

**Appellant:** LAM RESEARCH CORPORATION  
4650 Cushing Parkway  
Fremont, CA 94538-6470 (US)

**Representative:** W.P. Thompson & Co.  
55 Drury Lane  
London WC2B 5SQ (GB)

**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 28 October 2004  
refusing European application No. 96936061.9  
pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** R. G. O'Connell  
**Members:** R. Bekkering  
U. Tronser

## Summary of Facts and Submissions

- I. This is an appeal against the refusal of application 96 936 061 for added subject-matter (main request) and lack of inventive step (auxiliary request).
- II. At oral proceedings before the board the appellant applicant requested that the decision under appeal be set aside and  
as **main request** that a patent be granted on the basis of claims and description pages filed in the oral proceedings,  
as **first auxiliary request** that a patent be granted on the basis of claims and description page filed in the oral proceedings, and  
as **second auxiliary request** that the case be remitted to the examining division for further prosecution.
- III. Claim 1 according to the main request reads as follows:
- "1. A method of clamping a dielectric substrate supported by a holder in a vacuum plasma processor chamber to said holder, said holder including one or more electrodes being in close proximity to an unexposed surface of the substrate, said method including applying a plasma to an exposed surface of the substrate simultaneously with applying a DC voltage to said one or more electrodes of the holder, wherein the one or more electrodes are electrically insulated from said plasma, the polarity of the DC voltage applied to each of said one or more electrodes is the same and an electrically conductive path is provided via the plasma from the exposed substrate surface to a terminal at a reference potential different from the DC*

*voltage applied to the one or more electrodes, whereby an electrostatic charge is applied to the exposed substrate surface by the plasma and an electrostatic clamping force is developed between the dielectric substrate and the holder."*

IV. Claim 1 according to the first auxiliary request corresponds to claim 1 of the main request wherein the expression "*dielectric substrate*" is replaced by "*dielectric workpiece*".

V. The following documents are referred to:

D3: US-A-5 310 453

D5: US-A-4 384 918

VI. The appellant applicant argued as follows:

The subject-matter of claim 1 of the main request involved an inventive step over the cited prior art. Document D5 was the only prior art dealing with clamping a dielectric workpiece. However, the underlying principle was entirely different, as it was based on the field lines between the two electrodes within the chuck running through the workpiece. The remaining prior art was based on clamping by charge separation taking place within the workpiece. In a dielectric workpiece such charge separation was not possible. Also in document D3, where a semiconductor wafer was clamped, the underlying principle was charge separation in the wafer.

The first auxiliary request corresponded to the claims the examining division proposed for grant. Following decision G 10/93 the board, as a reviewing tier of jurisdiction, should not reopen examination of these claims which were not the subject of the refusal decision under appeal.

Finally, if the board should refuse the foregoing requests, the case should be remitted to the examining division, so as to avoid a negative decision on the issue of inventive step being taken against the appellant without him having the opportunity to argue the case at two levels of jurisdiction.

## **Reasons for the Decision**

1. The appeal is admissible.
2. *Main request*
- 2.1 *Amendments*

Claim 1 is in substance based on claims 1 and 2 as originally filed. The expression "*dielectric substrate*" is used throughout the description and is thus a permissible amendment of the expression "*dielectric workpiece*" of originally filed claim 1.

The amendments comply with Article 123(2) EPC.

2.2 *Novelty, inventive step*

2.2.1 Document D3 discloses a method of clamping a substrate in a vacuum plasma processing chamber to a holder (chuck 10) (see figure 1 and corresponding description). The holder includes an electrode (16) in close proximity of the unexposed surface of the substrate. The electrode (16) is covered by an insulating layer (12), as may be the case in the application (see description page 13, lines 15 to 28 and figure 4). The method includes applying a plasma to the exposed substrate surface simultaneously with applying a high DC voltage (64) to the holder electrode, the holder electrode being insulated from the plasma. Furthermore, the grounded upper case (30) is used as the other electrode of the electrostatic chuck. When a plasma is generated, a conductive path is provided via the plasma from the exposed substrate surface to the grounded upper case (30) of the plasma processing chamber. Thereby, an electrostatic charge is applied to the exposed substrate surface by the plasma and an electrostatic (Coulomb) clamping force is developed between the dielectric substrate and the holder (see column 4, line 64 to column 5, line 2; column 6, lines 1 to 10).

The substrate in document D3 is eg a semiconductor wafer, whereas according to claim 1 of the main request it is a dielectric substrate.

The subject-matter of claim 1 is thus novel over document D3, which the board judges to be the closest prior art.

2.2.2 Hence the objective problem to be solved, starting from document D3, is to provide a method for clamping dielectric substrates.

Dielectric substrates encompassed by the application under appeal are comparable to semiconductor wafers in terms of the (plasma) processes they are subjected to and in terms of their dimensions. The glass panels for flat panel displays mentioned in the application typically have semiconductor devices formed thereon and the process used for manufacturing are comparable to those used for processing semiconductor wafers. Moreover, the glass substrates used in the application have dimensions of eg 320 x 340 mm and a thickness of 1.1 mm (see application, page 9, first paragraph; page 15, third paragraph) and are generally comparable to eg 200 mm silicon wafers of about the same thickness typically used at the filing date of D3. Furthermore, SOI (silicon on insulator) wafers and the like, commonly used in the semiconductor industry, would in general also fall under the definition of a "dielectric substrate" as per claim 1.

Furthermore, dielectric substrates would not behave fundamentally differently to semiconductor wafers. Semiconductor wafers are typically lightly doped and, therefore, have electrical properties much closer to dielectrics than to conductors. According to document D3, "*the grounded upper case 30 is used as the other electrode for an electrostatic chuck. When a plasma is generated, the wafer W is grounded through the plasma and the upper case 30*" (column 4, lines 64 to 67) and "*...the wafer W is left on the polyimide sheet 12 while it is kept charged by the potential of the ground. For*

*this reason, a relatively strong Coulomb force is generated between the wafer W and the conductive sheet 16 with the negative or positive potential, which oppose each other through the thin insulating layer 12. As a result, the wafer W is fixed/held on the electrostatic chuck 10" (column 6, lines 1 to 10). Contrary to the appellant's contention, the underlying principle in D3 is, thus, not charge separation in the substrate but charge build-up on the substrate, in substance as in the application (see page 12, lines 1 to 21).*

Differences in charge build-up and distribution on dielectric substrates compared to semiconductor wafers, if any, would, moreover, merely result in a somewhat different attractive force between substrate and chuck electrode, which may be readily adjusted by adapting the voltage level applied to the chuck electrode. Such adjustments would fall within the competence of the average practitioner.

Accordingly, it would be obvious for the skilled person to apply the method known from document D3 to dielectric substrates as well.

The subject-matter of claim 1 of the main request, thus, lacks an inventive step (Articles 52(1) and 56 EPC).

3. *First auxiliary request*

3.1 *Admissibility of request*

Although filed at an unduly late stage of the proceedings, the request is by way of exception



admitted into the proceedings since it corresponds to a claim proposal drafted by the examining division in the course of the examination proceedings and the appellant in his statement of the grounds of appeal at least implicitly sought grant of a patent based on this proposal.

### 3.2 *Competence to examine*

The appellant, invoking decision G 10/93, argued that as the claims of the first auxiliary request corresponded to the claims the examining division proposed for grant, the board, as a reviewing level, should not reopen examination of these claims.

The appellant's contention is, however, not supported by the decision of the Enlarged Board of Appeal G 10/93 (OJ EPO 1995, 172), according to which (see headnote) *"In an appeal from a decision of an examining division in which a European patent application was refused the board of appeal has the power to examine whether the application or the invention to which it relates meets the requirements of the EPC. The same is true for requirements which the examining division did not take into consideration in the examination proceedings or which it regarded as having been met. If there is reason to believe that such a requirement has not been met, the board shall include this ground in the proceedings"* (present board's emphasis).

Neither is the appellant's rejoinder that the facts underlying G 10/93 were not comparable to those of the present case convincing. The specific issue in G 10/93 was whether the referring board could examine the

ground relating to the requirement of inventive step which the examining division regarded as having been met, and is thus substantially identical to the issue in the present case.

It is also noted that the examining division is itself not bound by a positive view expressed in the course of the examination pursuant to Article 96(2) EPC 1973 (Article 94(3) EPC 2000) (see G 10/93, reasons 7).

Moreover, there is no obligation on the board in these circumstances to remit the case to the examining division (*ibid*). In fact, in the present case the board does not consider it appropriate to remit the case to the examining division for further prosecution for the reasons set out below in connection with the second auxiliary request.

### 3.3 *Inventive step*

Claim 1 according to the first auxiliary request differs from that of the main request solely in that the expression "*dielectric substrate*" is replaced by "*dielectric workpiece*".

The above reasoning, however, applies with equal force to a "*dielectric workpiece*" so that this amendment does not alter the above finding of lack of inventive step.

Accordingly, the subject-matter of claim 1 of the first auxiliary request also lacks an inventive step (Articles 52(1) and 56 EPC).

4. *Second auxiliary request*

The appellant argued that the case should be remitted to the examining division, so as to preclude a negative decision on the issue of inventive step being taken without giving the appellant the opportunity to argue his case at two levels.

As set out in G 10/93, if there is reason to believe that a condition for patentability may not have been satisfied, the board either incorporates it into the appeal proceedings or ensures by way of remittal to the examining division that it is included when examination is resumed (G 10/93 reasons 4).

In the board's judgement a remittal is not appropriate where the board, based on the same facts and evidence considered by the examining division, has come to the conclusion that a requirement has not been met whereas the examining division saw this requirement being fulfilled.

The appellant's request for remittal implies an independent reassessment by the examining division of the same issue of inventive step based on the same available prior art, and thus without any instructions from the board as to what the examining division should take into consideration or how it should rectify its factual reasoning. Unless the examining division has in the meantime changed its view, such a reassessment is bound to confirm the examining division's previous finding that the requirement of inventive step is met. Such a remittal would be tantamount to an order to grant. It follows that under the present circumstances

the board has no alternative but to incorporate the issue into the appeal proceedings and to decide itself on the patentability requirement it had reasons to suspect had not been met. Where the decision on the issue reached in the end is that the requirement is not met, a subsequent remittal would be self-contradictory.

The above is all the more true in the present case, as the board has already decided that the requirement of inventive step is not met with respect to claim 1 according to the appellant's main request and this decision reached applies with equal force to claim 1 according to the first auxiliary request which is in substance no different.

For the reasons above the appellant's second auxiliary request for remittal to the examining division for further prosecution is refused.

## **Order**

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

The appeal is dismissed.

Registrar

Chair

S. Sánchez Chiquero

R. G. O'Connell