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**Datasheet for the decision
of 27 September 2012**

Case Number: T 1654/07 - 3.4.03

Application Number: 01121029.1

Publication Number: 1184895

IPC: H01L 21/00

Language of the proceedings: EN

Title of invention:

Substrate processing apparatus and substrate inspection method

Applicant:

Dainippon Screen Mfg. Co., Ltd.

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 123(2)

Relevant legal provisions (EPC 1973):

EPC Art. 54, 56, 84

Keyword:

"Novelty (yes)"

"Inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 1654/07 - 3.4.03

DECISION
of the Technical Board of Appeal 3.4.03
of 27 September 2012

Appellant:
(Applicant)

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Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 31 May 2007
refusing European patent application
No. 01121029.1 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: G. Eliasson
Members: T. Häusser
P. Mühlens

Summary of Facts and Submissions

- I. The appeal concerns the decision of the examining division to refuse European patent application No. 01 121 029 for lack of novelty (Article 54 EPC 1973).
- II. The appellant requested in writing that the decision under appeal be set aside and that a patent be granted in the following version:
- claims 1 and 2, filed at the oral proceeding,
 - description: page 1, filed at the oral proceedings, pages 2 and 3 filed with letter of 21 August 2012, pages 5 to 28 as originally filed, page 29 filed with letter of 21 August 2012 (page 4 deleted),
 - drawings 1 to 8 as originally filed.
- III. The wording of claim 1 of the sole request reads as follows (board's labelling):
- "A substrate inspection method for inspecting a substrate comprising:
- (i) a processing step of succesively transporting a set of plural substrates between a plurality of processing parts (SC, SD, HP, CP, PEB) along the same procedure thereby performing substrate processing; and
 - (ii) an inspection step of performing a single inspection selected from a plurality of substrate inspections of different contents on each substrate of said set of plural substrates thereby performing each of said plurality of substrate

inspections on at least one substrate of said set of plural substrates."

IV. Reference is made to the following document:

D3: GB 2 265 634 A.

V. The appellant argued essentially as follows:

The invention allowed that all kinds of inspections could be performed on a set of plural substrates as a whole in a relatively short time. Thus a balance between an appropriate inspection and processing time was established.

Reasons for the Decision

1. Admissibility

The appeal is admissible.

2. Amendments

Claim 1 is based on original claim 7 and on the description as originally filed (page 16, paragraph 2 - page 17, paragraph 2).

Dependent claim 2 is based on original claim 8.

The description has been brought into conformity with the amended claims and the relevant state of the art has been indicated without extending beyond the content of the application as filed.

Accordingly, the board is satisfied that the amendments comply with the requirements of Article 123(2) EPC.

3. Novelty

3.1 Document D3 discloses (see Figure 1 and pages 5-8) a thin film growth chamber 2 for growing a thin film on a substrate, a substrate pre-process chamber 3 (e.g. for etching a substrate) and an inspection chamber 6 in which prescribed analyses of a semiconductor substrate are performed (e.g. thickness measurements; determination of the presence of an oxide film; measurements of resistivity, composition, surface conditions; ...).

A cassette of substrates 15 is stored in a load/unload chamber 10. The substrates 15 are transferred one by one by the handler 13 to the process chambers 2 and 3 and the inspection chamber 6. It is also disclosed that, when a substrate 15 is determined to be defective, subsequent inspections may be omitted and the defective substrate stored in the defective substrate storage chamber 9.

3.2 In the terms of claim 1 document D3 discloses a substrate inspection method for inspecting a substrate (using inspection chamber 6) comprising:
a processing step of successively transporting a set of plural substrates (cassette of wafers) between a plurality of processing parts (processing chambers 2 and 3) along the same procedure thereby performing substrate processing (etching, thin film growing).

Document D3 does not disclose the feature (ii) of claim 1 relating to an inspection step (see point III. above).

The subject-matter of claim 1 is therefore new over document D3.

- 3.3 The remaining state of the art documents on file are not closer to the subject-matter of claim 1 than document D3. Claim 2 is dependent on claim 1 providing further limitations of the method according to claim 1.

Accordingly, the subject-matter of claims 1 and 2 is new (Article 52(1) EPC and Article 54(1) EPC 1973).

4. Inventive step

4.1 Closest state of the art

Document D3 is regarded as the closest state of the art, from which the subject-matter of claim 1 differs in comprising feature (ii) (see point III. above) relating to an inspection step of performing a single inspection selected from a plurality of substrate inspections of different contents on each substrate of said set of plural substrates thereby performing each of said plurality of substrate inspections on at least one substrate of said set of plural substrates.

4.2 Objective technical problem

- 4.2.1 In order to determine the objective technical problem the effects of the differing feature (ii) are to be considered.

Performing an inspection in the method according to D3 involves introducing the substrate into the inspection chamber 6 and performing the measurements of an inspection. While these steps are carried out, the substrate under inspection cannot be further processed. Furthermore, since the substrates 15 in the cassette are processed sequentially, the processing of the other substrates is also delayed.

By performing only a single inspection on each substrate (first part of feature (ii)), the delay in the processing of the substrates is reduced.

- 4.2.2 On the other hand, by performing several inspections of different contents the method of D3 allows different aspects of the process and the substrates to be monitored. Using the results of the inspections a feedback may be provided to adjust the process parameters. Furthermore, in case a substrate 15 is determined to be defective it may be removed from the process sequence.

Performing each of the inspections on at least one substrate of the set of substrates (second part of feature (ii)) allows different aspects of the process and the set of substrates as a whole to be monitored.

- 4.2.3 In the application as originally filed it is mentioned (see page 4, lines 18-20) that the object of the invention was to provide a substrate processing technique capable of properly inspecting a substrate while suppressing reduction of the throughput. That is

also essentially the object that was stated by the appellant.

However, since several inspections of different contents are carried out in the method of D3, "proper inspection" is already known from that document. This should be taken into account when formulating the objective technical problem.

4.3 In view of the above, the objective technical problem is to increase the throughput while allowing different aspects of the process to be monitored.

4.4 Obviousness

4.4.1 As mentioned above, it is envisaged in document D3 that, when a substrate 15 is determined to be defective, subsequent inspections (of different contents) may be omitted. Therefore, when the first inspection yields the result that the substrate is defective, the other inspections may be omitted so that only a single inspection would be carried out on that substrate. Indeed, in that case the other inspections would serve no purpose as the substrate had already been determined to be defective so that the substrate could not be properly completed.

4.4.2 However, it has not been disclosed in document D3 to omit an inspection of a particular content on a substrate which has *not* been determined to be defective. Furthermore, such an omission involves the risk that a defect in the substrate, which is detectable by an inspection of that content, remains unnoticed. The

process might thus be completed on the defective substrate and a faulty product might be manufactured.

Moreover, performing the inspection step as foreseen in feature (ii) of claim 1 might lead to a cumbersome untangling of the manufacturing process of the entire set of substrates. Specifically, in case a substrate is detected to be defective by the inspection of a particular content, the substrates which had previously been processed and not been inspected by that inspection, might have to be re-examined using that inspection.

The skilled person would therefore be discouraged to solve the posed problem using feature (ii).

- 4.4.3 Furthermore, none of the other documents of the state of the art on file contains a teaching that would lead the skilled person in an obvious way to the subject-matter of claim 1.

Claim 2 is dependent on claim 1 providing further limitations of the method of claim 1.

- 4.4.4 In view of the above, the board is satisfied that the subject-matter of claims 1 and 2 involves an inventive step under Article 56 EPC 1973.

5. Other requirements of the EPC and conclusion

In view of the amendments effected during the appeals proceedings, the claims are regarded to be clear (Article 84 EPC 1973). Furthermore, in order to comply with the requirements of Article 84 EPC 1973 and

Rule 27(1)(b) EPC 1973, the description has been brought into conformity with the amended claims and supplemented with an indication of the relevant content of the state of the art.

In view of the above the sole request is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent in the following version:
 - claims 1 and 2, filed at the oral proceeding,
 - description: page 1, filed at the oral proceedings, pages 2 and 3 filed with letter of 21 August 2012, pages 5 to 28 as originally filed, page 29 filed with letter of 21 August 2012 (page 4 deleted),
 - drawings 1 to 8 as originally filed.

The Registrar:

The Chairman:

S. Sánchez Chiquero

G. Eliasson