
(88) Date of publication of the international search report: 16 August 2012

(54) Title: THERMAL GRADIENT CHEMICAL VAPOUR DEPOSITION APPARATUS AND METHOD

![Diagram of thermal gradient chemical vapour deposition apparatus](image-url)

(57) Abstract: A chemical vapour deposition (CVD) apparatus is configured for thermal gradient enhanced CVD operation by the inclusion of multiple heaters, positioned so as to provide a desired thermal gradient profile across a vertical dimension of a substrate or other work piece within the chamber. So configured, the chamber may also be used for controlled growth of thin films via diffusion through intermediate films, either top down or bottom parallel to the direction of the thermal gradient.
A. CLASSIFICATION OF SUBJECT MATTER
INV. C23C 16/455

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C23C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tbody>
<tr>
<td>Y</td>
<td>Wo 95/06143 AI (PHYSI KALISCHES BUER0 STEINMUEL [AT]) 2 March 1995 (1995-03-02) page 8, line 19 - page 10, line 3; figure 2</td>
<td>1-5</td>
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<tr>
<td>A</td>
<td>JP 7 273101 A (TOKYO ELECTRON LTD; TOKYO ELECTRON LTD) 20 October 1995 (1995-10-20) abstract</td>
<td>1-5, 9-15</td>
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</table>

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
  *A* document defining the general state of the art which is not considered to be of particular relevance
  *E* earlier application or patent but published on or after the international filing date
  *L* document which may throw doubts on priority claim(s) one of which is cited to establish the publication date of another citation or other special reason (as specified)
  *O* document referring to an oral disclosure, use, exhibition or other means
  *P* document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search
19 January 2012

Date of mailing of the international search report
22/06/2012

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040; Fax: (+31-70) 340-3016

Authorized officer
Ekhul I, Hans
### DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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<tr>
<td><strong>A</strong></td>
<td>WO 2009/144456 A1 (AIXTRON AG [DE]; TEO KENNETH [GB]; RUPESINGHE NALIN [GB]) 3 December 2009 (2009-12-03) the whole document</td>
<td>1-5,9-15</td>
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<td>WO 2009144456 A1</td>
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This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. **Claims Nos.**
   - because they relate to subject matter not required to be searched by this Authority, namely:

2. **Claims Nos.**
   - because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. **Claims Nos.**
   - because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

This International Searching Authority found multiple inventions in this international application, as follows:

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see additional sheet
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1. **As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.**

2. **As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.**

3. **As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.**

4. **No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:**

   1-5, 9-15

**Remark on Protest**

- The additional search fees were accompanied by the applicant’s protest and, where applicable, the payment of a protest fee.

- The additional search fees were accompanied by the applicant’s protest but the applicable protest fee was not paid within the time limit specified in the invitation.

- No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5, 9-15
   CVD method and apparatus using special heater configuration,
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2. claims: 6-8
   CVD apparatus with adjustable heater with specific area coverage.
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