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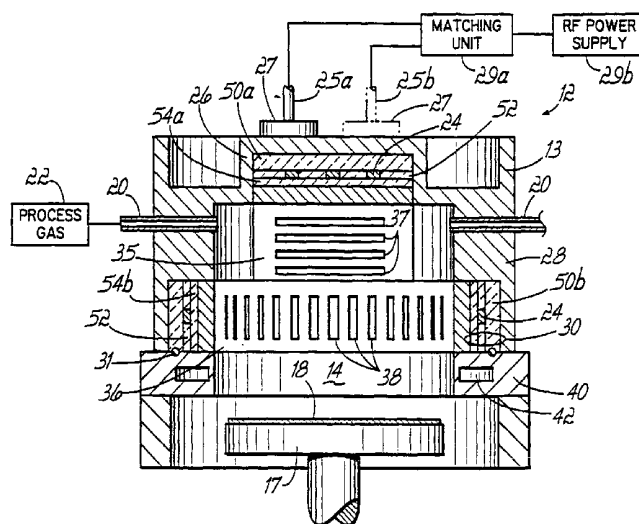
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[Continued on next page]

(54) Title: INDUCTIVELY COUPLED PLASMA USING AN INTERNAL INDUCTIVE ELEMENT



(57) **Abstract:** A processing system (12) for processing a substrate with an ionized plasma comprises a processing chamber (13) defining a processing space (14) and including a substrate support (17) therein for supporting a substrate (18) in the processing space. A gas inlet (20) introduces a process gas into said processing space (14) and a plasma source is operable for creating an ionized plasma in the processing space from process gas introduced therein. The plasma source comprises an inductive element (24) operable for coupling electrical energy into the processing space to create an ionized plasma therein. The inductive element (24) winds around a portion of the processing space (14) inside the processing chamber (13) and is encased inside a dielectric material (30) to physically separate the element from the processing space while allowing the element to couple electrical energy into the processing space. Alternatively, the inductive element is coupled to a DC power supply (98) for enhancing the magnetization of the inductive element (24) to reduce the capacitive coupling of energy between the inductive element and the plasma.



**(88) Date of publication of the international search report:**  
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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/27024

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01J37/32 H01J37/34

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)

IPC 7 H01J

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 practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 591 493 A (MATTHEWS ROBERT T ET AL) 7 January 1997 (1997-01-07)  column 3, line 52 -column 4, line 35 column 5, line 32 - line 42 figures 1,6  ---	1-4,6,7, 10,11, 23-27
X	WO 00 17906 A (APPLIED MATERIALS INC) 30 March 2000 (2000-03-30) page 20, line 22 -page 25, line 18 page 28, line 25 -page 29, line 17 figures 3-6  ---  -/--	1-8,10, 23-26

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in 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 document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or 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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

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International Application No

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 14, 22 December 1999 (1999-12-22) & JP 11 251303 A (TOKYO ELECTRON YAMANASHI LTD; JAPAN SCIENCE & TECHNOLOGY CORP), 17 September 1999 (1999-09-17) abstract figures	1-4,8, 10,23-26
P,X	-& US 6 149 760 A (HAMA KIICHI) 21 November 2000 (2000-11-21) column 6, line 62 -column 7, line 47 figure 3	1-4,8, 10,23-26
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P,X	-& US 6 245 202 B1 (EDAMURA MANABU ET AL) 12 June 2001 (2001-06-12) column 4, line 16 -column 5, line 26 figure 1	1-4,8, 10,23-26
X	--- US 5 948 215 A (LANTSMAN ALEXANDER D) 7 September 1999 (1999-09-07) column 7, line 17 - line 38 figure 4 -----	1-4,9, 10,23-26

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 01/27024

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

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).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

see additional sheet

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 fee, this Authority did not invite payment of any additional fee.
  
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.:

1-12,23-27

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-12,23-27

Plasma processing with an inductive element encased inside a dielectric material

2. Claims: 13-18,28-32

Plasma processing with a DC electrical energy source coupled to an inductive element.

3. Claims: 19-22

Plasma processing with an electrostatic shield positioned proximate an inductive element

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/27024

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