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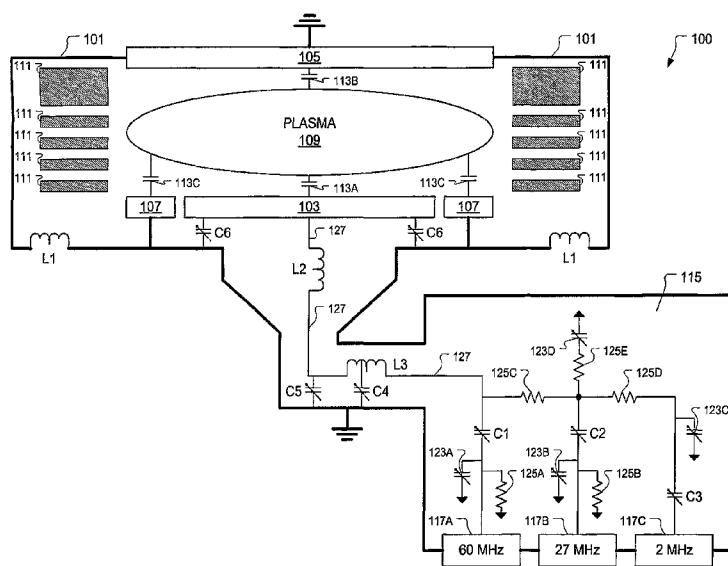
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(54) Title: APPARATUS AND METHOD FOR CONTROLLING PLASMA DENSITY PROFILE



(57) Abstract: A number of RF power transmission paths are defined to extend from an RF power source through a matching network, through a transmit electrode, through a plasma to a number of return electrodes. A number of tuning elements are respectively disposed within the number of RF power transmission paths. Each tuning element is defined to adjust an amount of RF power to be transmitted through the RF power transmission path within which the tuning element is disposed. A plasma density within a vicinity of a particular RF power transmission path is directly proportional to the amount of RF power transmitted through the particular RF power transmission path. Therefore, adjustment of RF power transmitted through the RF power transmission paths, as afforded by the tuning element, enables control of a plasma density profile across a substrate.

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<p>A. CLASSIFICATION OF SUBJECT MATTER                  IPC(8) - H01L 21/683 (2008.04)                  USPC - 361/234                  According to International Patent Classification (IPC) or to both national classification and IPC</p>																						
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols)                  IPC(8) -H01L 21/683 (2008.04)                  USPC - 361/234</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)                  Google, Google Patents, PUBWEST (PGPB, USPT, USOC, EPAB, JPAB)                  Search Terms Used: Plasma, deposition, density, distribution, control, electrodes, capacitive, actuators, matching, network, matching network, database, computer, tuning, elements.</p>																						
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 6,962,664 B2 (MITROVIC) 8 November 2005 (08.11.2005), col 7, ln 61 to col 8, ln 11, Figure 3, col 9, ln 16 - ln 44, Figure 3, col 7, ln 61 to col 8, ln 11, col 9, ln 16 to col 10, ln 1, col 7, ln 4 - ln 30, col 8, ln 19 - ln 27, col 9, ln 16 to col 10, ln 1, col 13, ln 21 - ln 38, col 11, ln 35 - ln 47, col 4, ln 19 - ln 42, col 3, ln 19 - ln 44, col 5, ln 50 - ln 67, Figure 2, Figure 3, col 10, ln 37 to col 11, ln 47, col 10, ln 37 to col 11, ln 47.</td> <td>1-20</td> </tr> </tbody> </table> <p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/></p> <p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"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</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"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</td> </tr> <tr> <td>"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)</td> <td>"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</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table> <table border="1"> <tr> <td>Date of the actual completion of the international search 27 November 2008 (27.11.2008)</td> <td>Date of mailing of the international search report <b>05 DEC 2008</b></td> </tr> <tr> <td>Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201</td> <td>Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774</td> </tr> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 6,962,664 B2 (MITROVIC) 8 November 2005 (08.11.2005), col 7, ln 61 to col 8, ln 11, Figure 3, col 9, ln 16 - ln 44, Figure 3, col 7, ln 61 to col 8, ln 11, col 9, ln 16 to col 10, ln 1, col 7, ln 4 - ln 30, col 8, ln 19 - ln 27, col 9, ln 16 to col 10, ln 1, col 13, ln 21 - ln 38, col 11, ln 35 - ln 47, col 4, ln 19 - ln 42, col 3, ln 19 - ln 44, col 5, ln 50 - ln 67, Figure 2, Figure 3, col 10, ln 37 to col 11, ln 47, col 10, ln 37 to col 11, ln 47.	1-20	"A" document defining the general state of the art which is not considered to be of particular relevance	"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	"E" earlier application or patent but published on or after the international filing date	"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	"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)	"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	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"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 27 November 2008 (27.11.2008)	Date of mailing of the international search report <b>05 DEC 2008</b>	Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774
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