



(12) **United States Patent**
Masuda et al.

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(54) **PLASMA PROCESSING APPARATUS AND PLASMA PROCESSING METHOD**

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.⁷** **H01L 21/00**

(52) **U.S. Cl.** **438/715**; 156/345.44; 156/345.46; 156/345.48; 156/345.49; 216/68; 216/70; 438/729

(58) **Field of Search** 156/345 P, 345 C, 156/345 ME, 345 MG, 345 PH; 438/710, 715, 728, 729, 732; 216/67, 70, 71, 68

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(57) **ABSTRACT**

In a plasma processing apparatus that has a vacuum chamber, a process gas supply means of supply gas to a processing chamber, an electrode to hold a sample inside said vacuum chamber, a plasma generator installed in said vacuum chamber opposite to said sample, and a vacuum exhaust system to decrease pressure of said vacuum chamber, a bias voltage of $V_{dc} = -300$ to -50 V is applied and the surface temperature of said plate ranges from 100 to 200° C. In addition, the surface temperature fluctuation of the silicon-made plate in said plasma processing apparatus is kept within $\pm 25^\circ$ C.

10 Claims, 7 Drawing Sheets

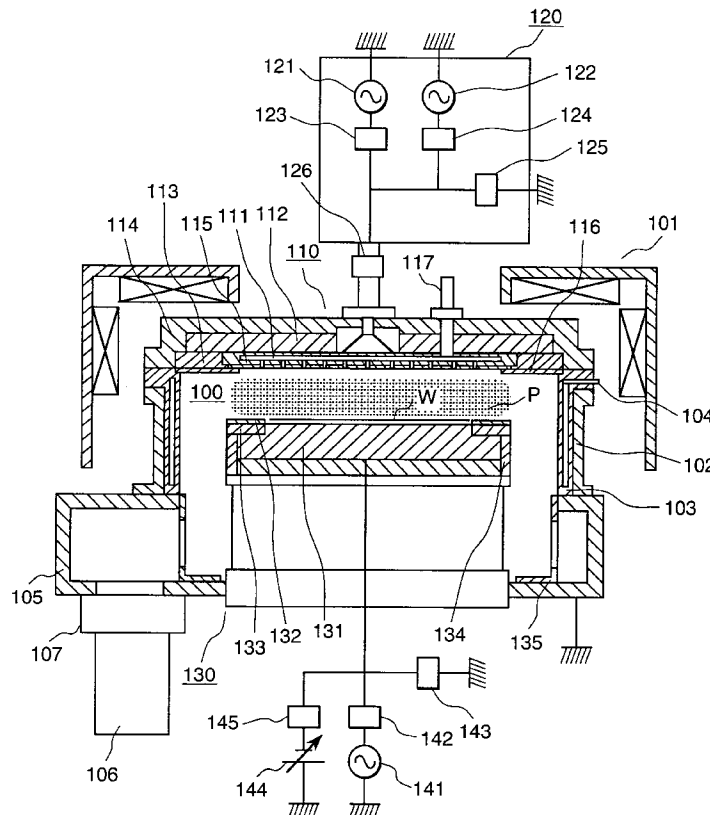


FIG. 1

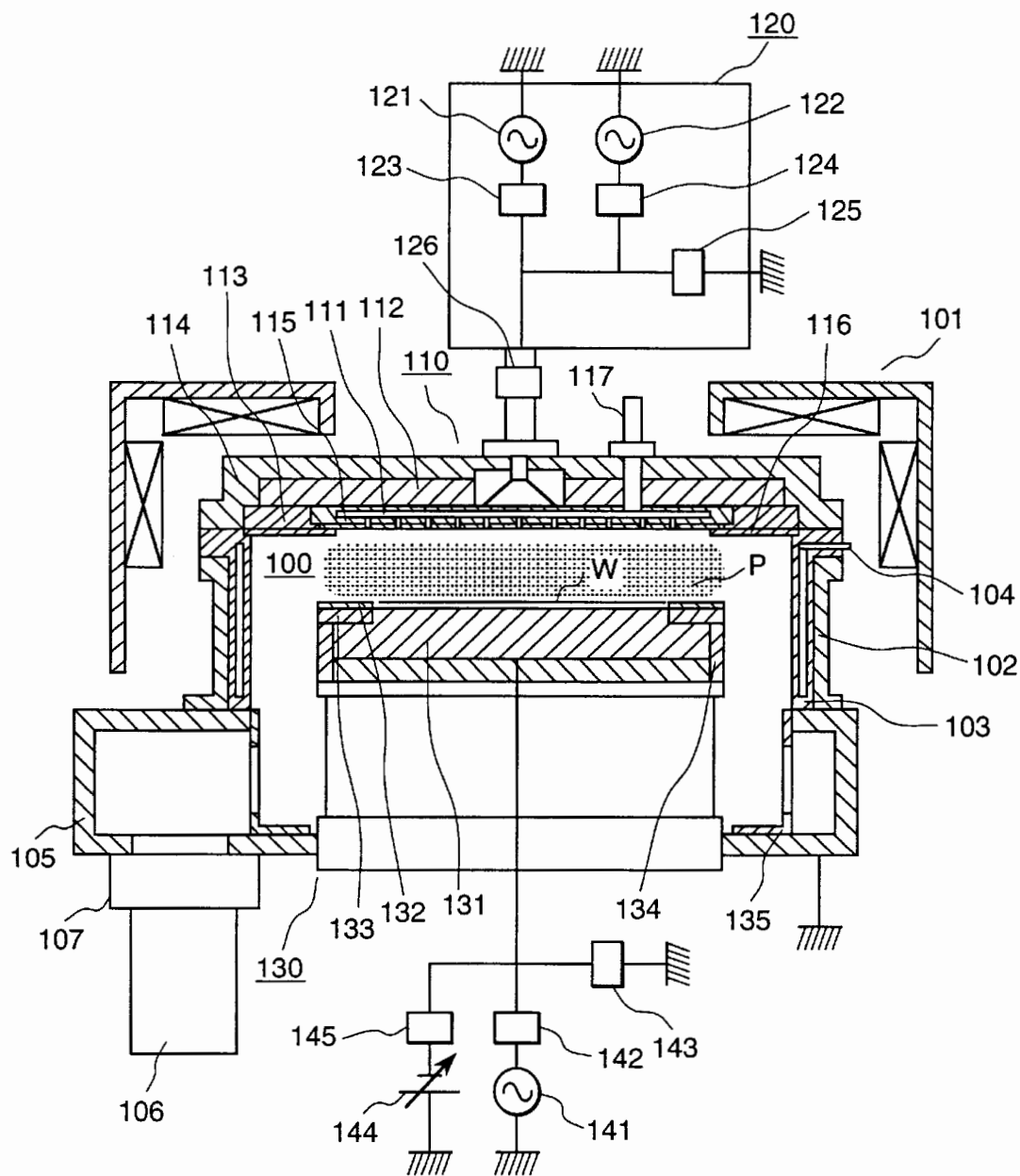


FIG. 2

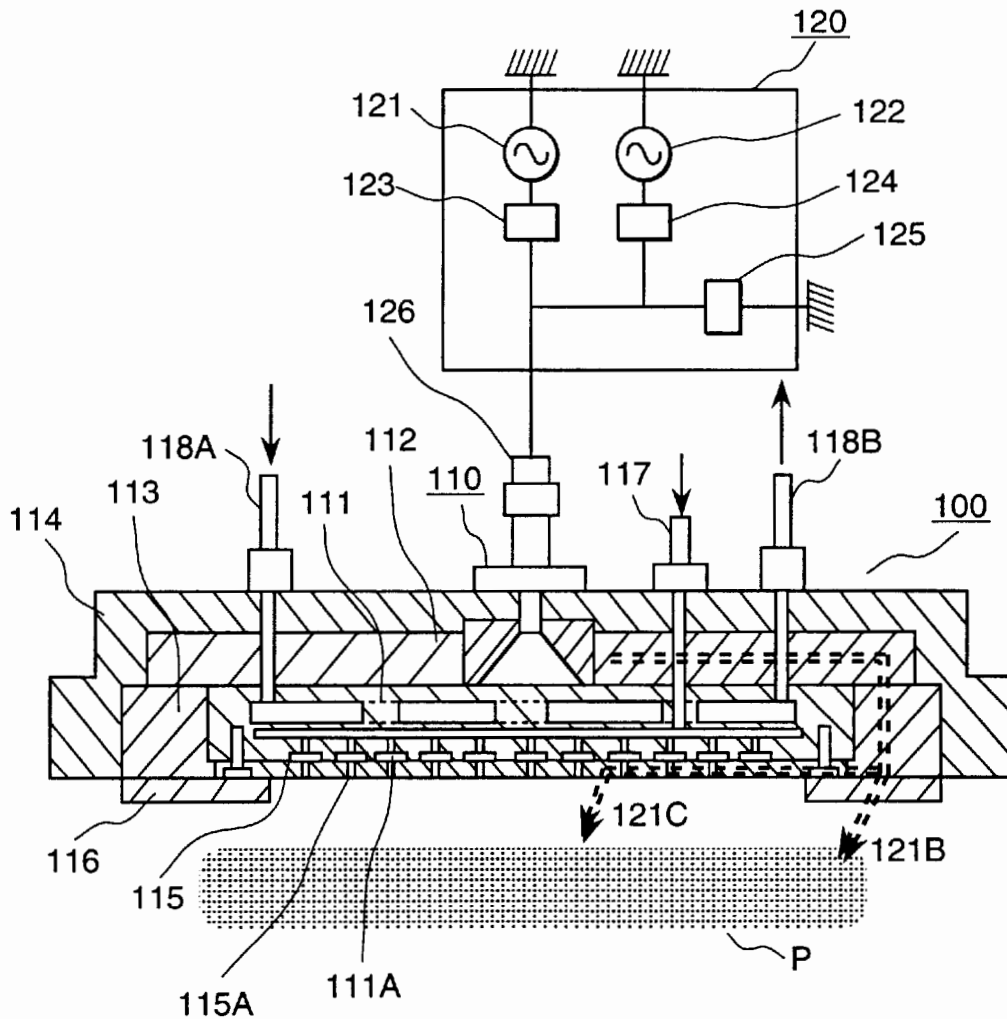


FIG. 3

Si ETCHING RATE ($\mu\text{m/h}$)

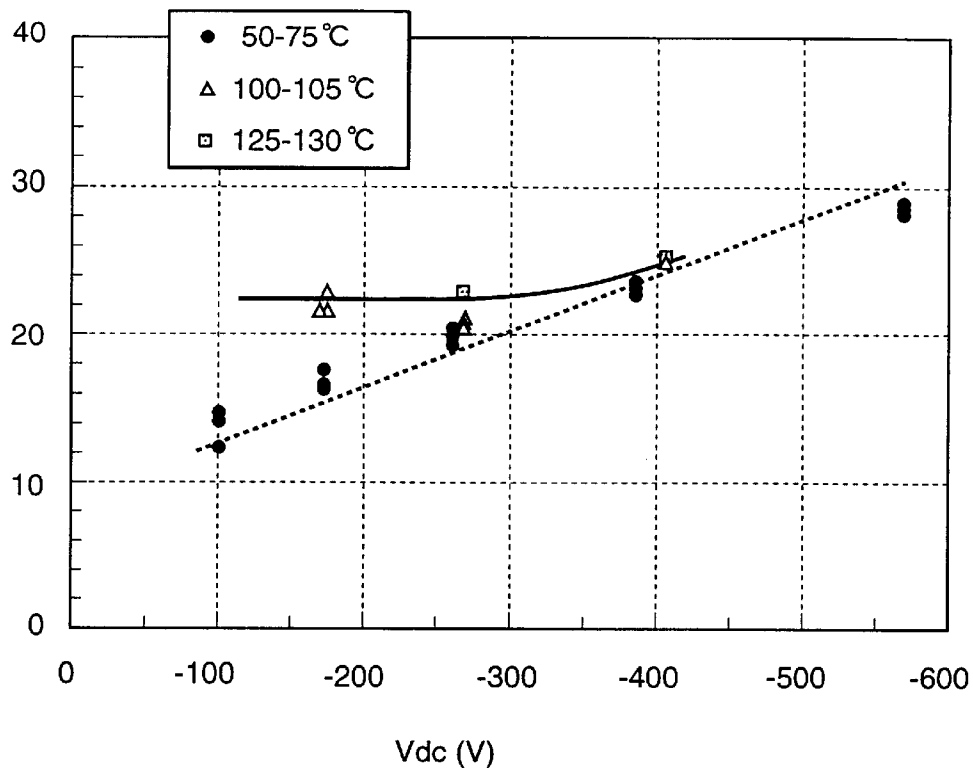


FIG. 4

TEMPERATURE (deg)

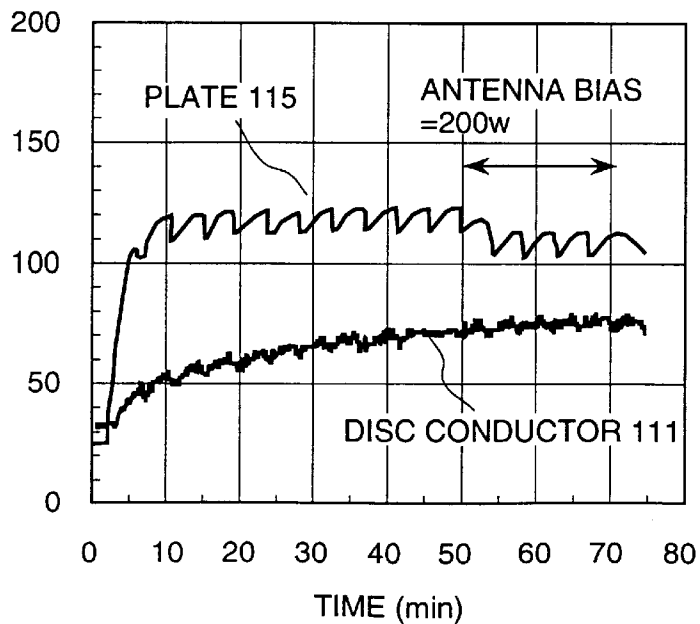


FIG. 5

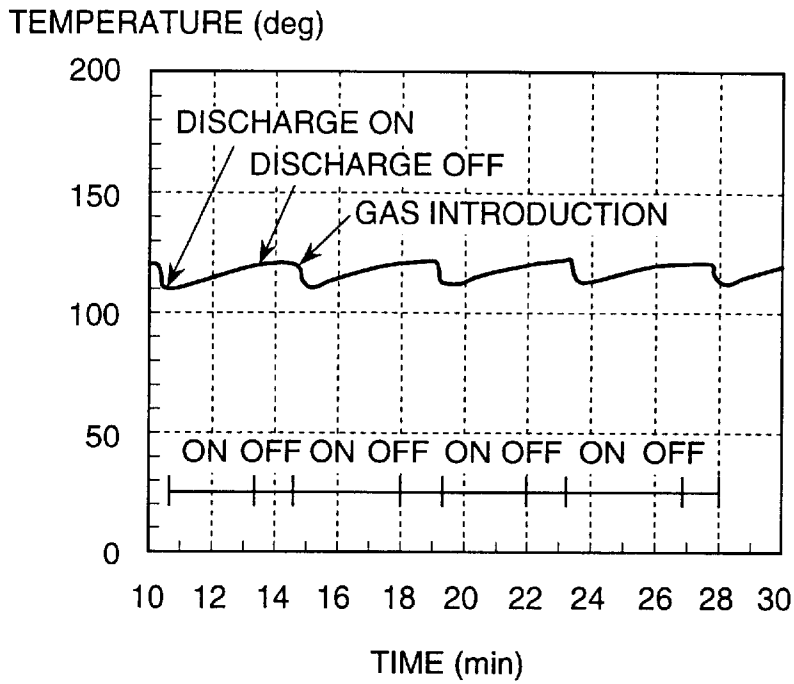
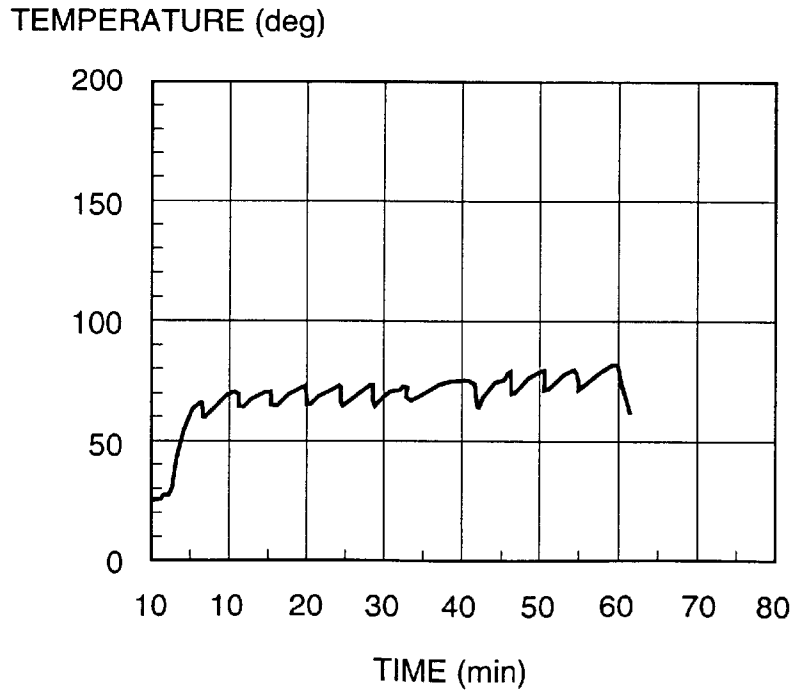


FIG. 6



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