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## United States Patent [19]

Collins et al.

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### [54] METHOD FOR PLASMA PROCESSING USING MAGNETICALLY ENHANCED PLASMA CHEMICAL VAPOR DEPOSITION

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**740 440** 

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[22] Filed: Nov. 23, 1990

### Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 559,947, Jul. 31, 1990, abandoned, and a continuation-in-part of Ser. No. 560,530, Jul. 31, 1990, abandoned, each is a continuation-in-part of Ser. No. 416,750, Oct. 3, 1989, abandoned.

[51]	Int. Cl.5	H01L 21/00; H01L 21/02;
		H01L 21/302; H01L 21/463
real	TIC O	425 /33E, 427 /330.

[52] U.S. Cl. ...... 437/228; 437/228; 427/571

[56]

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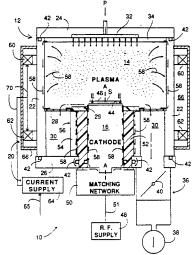
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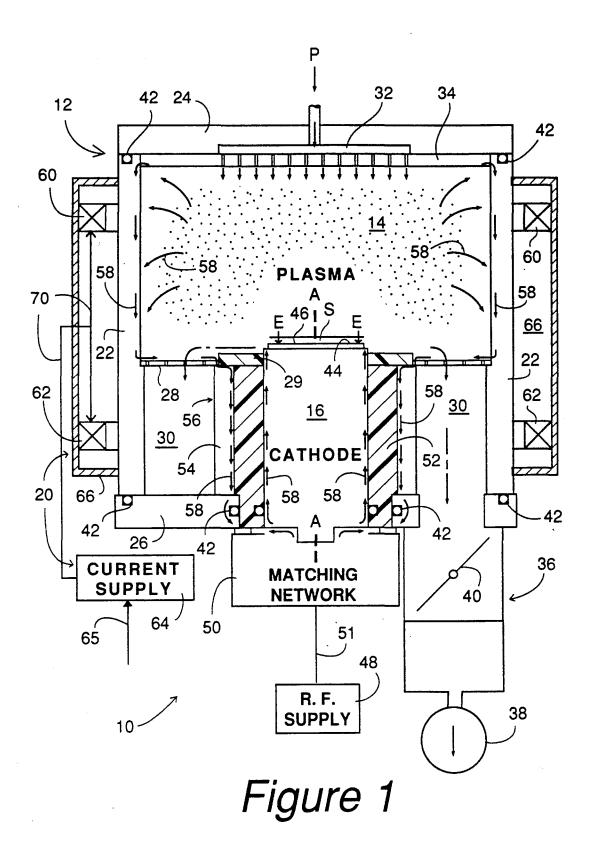
### [57] ABSTRACT

A method for plasma processing characterized by the steps of disposing a wafer proximate to a cathode within a process chamber, releasing a gas into the chamber, applying R.F. power in the VHF/UHF frequency range to the cathode to form a plasma within the chamber, developing a magnetic field within the chamber having flux lines substantially perpendicular to the surface of the wafer, and varying the strength of the magnetic field until a desired cathode sheath voltage is attained. The apparatus includes a chamber, a wafer-supporting cathode disposed within the chamber, a mechanism for introducing gas into the chamber, an R.F. power source coupled to the cathode operating in the frequency from about 50-800 megahertz, an electromagnetic coil disposed around the chamber adapted to develop a magnetic field within the chamber which is substantially perpendicular to the wafer and a variable output power supply coupled to the coil to vary the magnetic field strength and therefore the cathode sheath voltage within the chamber.

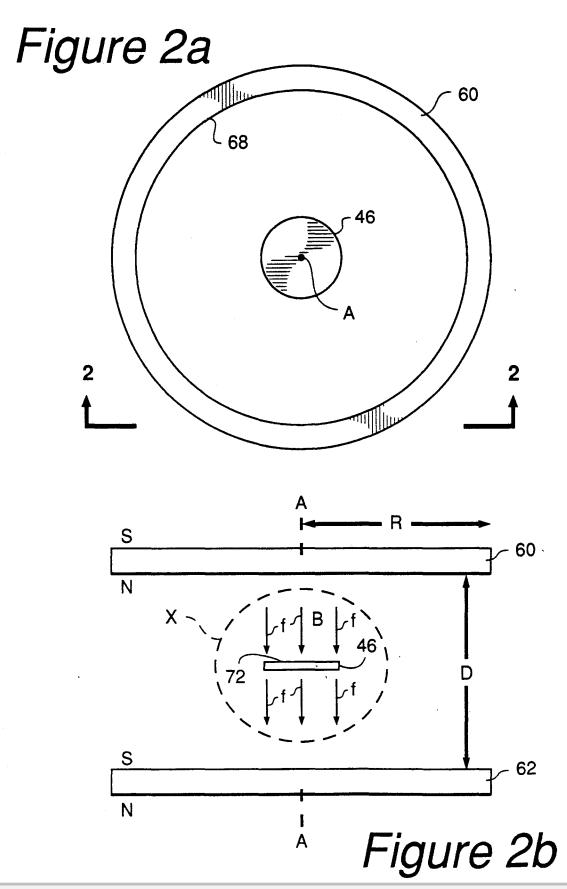
### 15 Claims, 5 Drawing Sheets



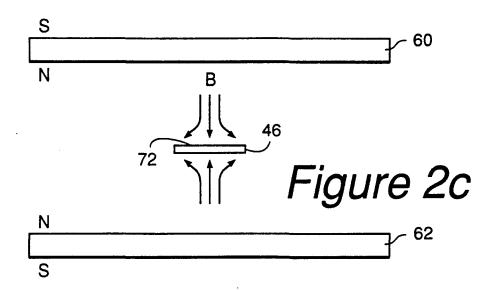


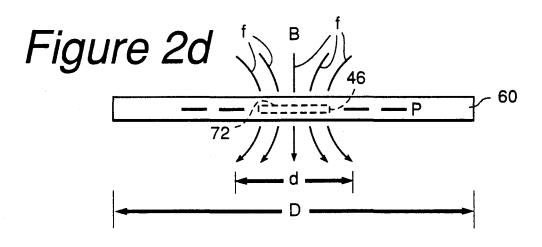


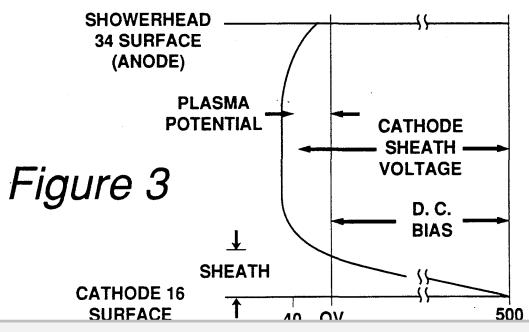




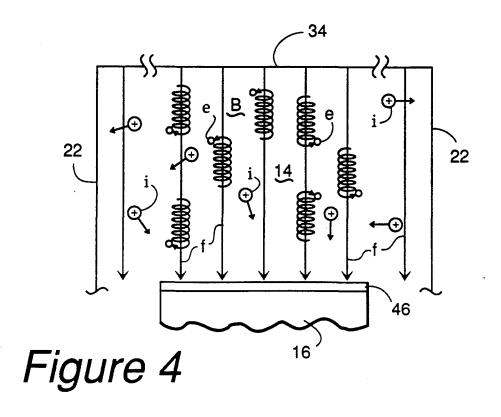


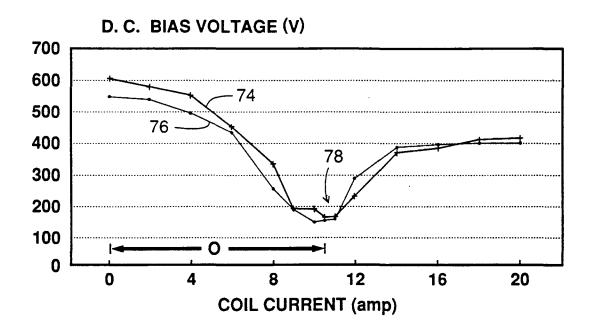
















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