CLAIMS

1. A method for controlling a plasma processing system including a plasma processing chamber, comprising:

receiving an RE signal from at least one component of said plasma processing chamber;

processing said RE signal in a digital domain to obtain peak voltage information for each fundamental frequency and a broadband frequency of said RE signal; and

deriving wafer bias information from said peak voltage information, wherein said wafer bias information is employed as one of a feedback and a control signal for said controlling said plasma processing system.

2. A method for controlling a plasma processing system including a plasma processing chamber, comprising:

receiving an RE signal from at least one component of said plasma processing chamber;

processing said RE signal to obtain peak voltage information for each fundamental frequency and a broadband frequency of said RE signal; and

deriving wafer bias information from said peak voltage information, wherein said deriving includes using at least one plasma processing chamber parameter in said deriving and wherein said wafer bias information is employed as one of a feedback and a control signal for said controlling said plasma processing system.

3. The method of claim 1, wherein said processing of said RF signal obtains a plurality of signals, said plurality of signals including at least individual signals corresponding to individual ones of multiple RF frequencies.

4. The method of claim 1 wherein said RF signal is inputted into a transfer function, and providing an output of said transfer function as a control signal to control a subsystem of said plasma processing system.

5. The method of claim 4 wherein said transfer function represents a linear transfer function.

6. The method of claim 5 wherein said linear transfer function is obtained using multi-variable analysis.

7. The method of claim 6 wherein said transfer function represents a non-linear transfer function.

8. The method of claim 5 wherein said RF signal is filtered using an anti-aliasing filter.

9. The method of claim 8 wherein said filtered RF of signal from said anti-aliasing filter is split into two channels to feed into a dual-channel analog/digital converter.

10. The method of claim 1 wherein said processing in the digital domain is performed by a field programmable gate array (FPGA).

11. The method of claim 1 wherein said deriving includes using at least one plasma processing chamber parameter.

12. The method of claim 11 wherein said at least one plasma processing chamber parameter includes chamber pressure, chamber gap distance between electrodes, RF delivered power, RF frequency, RF generator impedance matching network tap positions having capacitor positions of variable LC network, chamber Chemistry, chamber topology including a around area ratio, wafer type, and water resistivity.

13. The method of claim 12 wherein said chamber pressure is taken into account for providing enhanced accurate on-the-fly determination of wafer bias voltage.

14. The method of claim 1 wherein said control signal controls an RF generator.

15. The method of claim 2 wherein said at least one plasma processing chamber parameter includes chamber pressure, chamber gap distance between electrodes, RF delivered power, RF frequency, RF generator impedance matching network tap positions having capacitor positions of variable LC network, chamber chemistry, chamber topology including a ground area ratio, wafer type, and wafer resistivity.

16. The method of claim 15 wherein said chamber pressure is taken into account for providing enhanced accurate on-the-fly determination of wafer bias voltage.

17. The method of claim 16 wherein said control signal controls an RF generator.

18. The method of claim 17 wherein said processing of said RF signal obtains a plurality of signals, said plurality of signals including at least individual signals corresponding to individual ones of multiple RF frequencies.

19. The method of claim 18 wherein said RF signal is inputted into a transfer function, and providing an output of said transfer function as a control signal to control a subsystem of said plasma processing system.

20. The method of claim 19 wherein said RF signal is filtered using an anti-aliasing filter.

CLAIMS

What is claimed is:

1. A method for controlling a plasma processing system, comprising:

receiving an RF signal from at least one component of said chamber;

processing said RF signal in the digital domain to obtain peak voltage information for each fundamental frequency and a broadband frequency of said RF signal; and

deriving wafer bias information from said peak voltage information, wherein said wafer bias information is employed as one of a feed back and a control signal for said controlling said plasma processing system.

2. The method of claim 1 wherein said controlling said plasma processing system includes maintaining a desired wafer bias potential.

3. The method of claim 2 wherein said RF signal is received through a capacitive pickup component.

4. The method of claim 2 wherein said deriving takes into account at least plasma process parameter data.

5. The method of claim 4 wherein said plasma process parameter data includes at least one of a chamber pressure, chamber gap, RF delivered power, RF frequency, RF generator impedance matching network tap positions, chamber chemistry, chamber topology, and wafer resistivity.

6. The method of claim 5 wherein said processing includes taking into account independently inputted RF signal data.

7. The method of claim 6 wherein said processing includes employing said independently inputted RF signal data to perform tuning of digital filters employed for said processing.

8. The method of claim 6 wherein said independently inputted RF signal data includes at least one of a fundamental frequency and a drive signal phase for said RF signal.

9. The method of claim 4 wherein said processing includes filtering said RF signal using an anti-aliasing filter.

10. The method of claim 9wherein processing further includes performing analog-to-digital conversion on said RF signal after said filtering.

11. The method of claim 10 wherein a filter frequency of said anti-aliasing filter is less than half of a sampling frequency of an analog-to-digital converter employed for said analog-to-

digital conversion.

12. A plasma processing system having at least one chamber and an arrangement for deriving wafer bias information from an RF signal that is obtained from at least one component of said chamber, comprising:

an anti-aliasing filter for filtering said RF signal;

an analog-to-digital converter for performing analog-to-digital conversion on said RF signal after said filtering;

logic for processing said RF signal in the digital domain after said conversion to obtain peak voltage information for each fundamental frequency and a broadband frequency of said RF signal; and

logic for deriving wafer bias information from said peak voltage information, wherein said wafer bias information is employed as one of a feed back and a control signal for said controlling said plasma processing system.

13. The plasma processing system of claim 12 further comprising a capacitive pickup component for receiving said RF signal prior to said filtering.

14. The plasma processing system of claim 12 wherein said logic for deriving takes into account at least plasma process parameter data in computing said wafer bias information.

15. The plasma processing system of claim 14 wherein said plasma process parameter data includes at least one of a chamber pressure, chamber gap, RF delivered power, RF frequency, RF generator impedance matching network tap positions, chamber chemistry, chamber topology, and wafer resistivity.

16. The plasma processing system of claim 15 wherein said logic for processing takes into account independently inputted RF signal data in computing said peak voltage information and said broadband frequency.

17. The plasma processing system of claim 16 wherein said logic for processing employs said independently inputted RF signal data to perform tuning of digital filters employed for said processing.

18. The plasma processing system of claim 15 wherein said independently inputted RF signal data includes at least one of a fundamental frequency and a drive signal phase for said RF signal.