CLAIMS

1. A method for processing a substrate in a plasma processing chamber having an electrode, said plasma processing chamber having a plurality of RF power supplies coupled to provide a plurality of RF signals to said electrode, comprising:

pulsing a first one of said plurality of RF power supplies to generate a base RF pulsing signal,

wherein said pulsing the first one of said plurality of RF power supplies is performed during the processing of the substrate,

wherein said base RF pulsing signal pulses between a high power level and a low power level at a first pulsing frequency, wherein said base RF pulsing signal represents a first RF signal of said plurality of RF signals having a lowest pulsing frequency among pulsing frequencies of said plurality of RF signals, said lowest pulsing frequency being different from an RF frequency of said base RF pulsing signal;

sending a control signal to a second one of said plurality of RF power supplies, wherein said control signal is generated proactively in a manner that does not require sensing, during the processing of said substrate, of a change in one or more chamber parameters due to said pulsing of said first one of said plurality of RF power supplies; and

pulsing the second one of said plurality of RF power supplies, responsive to said control signal, between a first predefined power level and a second predefined power level different from said first predefined power level to generate a non-base pulsing RF signal, wherein said non-base pulsing RF signal represents a second RF signal of the plurality of RF signals, wherein said pulsing the second one of said plurality of RF power supplies is performed during the processing of the substrate, wherein the first and second predefined power levels are predetermined during a calibration operation that occurs before the processing of the substrate to reduce a chance of occurrence of a disturbance in plasma impedance, the disturbance caused when the base RF signal pulses between the high power level and the low power level.

2. The method of claim 1, wherein said control signal is transmitted from one of said plurality of RF power supplies.

3. The method of claim 1, wherein said control signal is transmitted from a master control circuit that is external of said plurality of RF power supplies.

4. The method of claim 1, wherein the RF power supplies in said plurality of RF power supplies generate different RF signals having different RF frequencies.

5. The method of claim 1, wherein said first predefined power level is generated during said high power level of said base RF pulsing signal.

6. The method of claim 1, wherein said second predefined power level is generated during said low power level of said base RF pulsing signal.

7. The method of claim 1, wherein said low power level of said base RF pulsing signal represents zero power.

8. The method of claim 1, wherein said second predefined power level represents zero power.

9. The method of claim 1, wherein said low power level of said base RF pulsing signal represents other than zero power.

10. The method of claim 1, wherein said second predefined power level represents other than zero power.

11. The method of claim 1, wherein pulsing of the second one of said RF power supplies is performed at another one of the pulsing frequencies, said another one of the pulsing frequencies being different from an RF frequency of the non-base pulsing RF signal generated by the second one of said RF power supplies.

12. The method of claim 1, wherein the first and second predefined power levels are predetermined to reduce a change in a power level of the non-base pulsing RF signal, the change occurring as a result of a transition of the base pulsing signal from the high power level to the low power level, the method further comprising:

sending the base RF pulsing signal and the non-base pulsing RF signal for provision to the electrode.

13. A method for processing a substrate in a plasma processing chamber having an electrode, said plasma processing chamber having a plurality of RF power supplies coupled to provide a plurality of RF signals to said electrode, comprising:

pulsing a first one of said plurality of RF power supplies to generate a base RF pulsing signal,

wherein said pulsing the first one of said plurality of RF power supplies is performed during the processing of the substrate,

wherein said base RF pulsing signal pulses between a high power level and a low power level at a first pulsing frequency, wherein said base RF pulsing signal represents a first RF signal of said plurality of RF signals having a lowest pulsing frequency among pulsing frequencies of said plurality of RF signals, said first pulsing frequency being different from an RF frequency of said base RF pulsing signal;

sending a control signal to a second one of said plurality of RF power supplies, wherein said control signal is generated proactively in a manner that does not require sensing, during the processing of said substrate, of a change in one or more chamber parameters due to said pulsing of said first one of said plurality of RF power supplies; and

switching an RF frequency output by the second one of said plurality of RF power supplies, responsive to said control signal, between a first predefined RF frequency and a second predefined RF frequency different from said first predefined RF frequency to generate a non-base pulsing RF signal, wherein said non-base pulsing RF signal represents a second RF signal of the plurality of RF signals, wherein said switching the RF frequency output by the second one of said plurality of RF power supplies is performed during the processing of the substrate, wherein the first and second predefined frequencies are predetermined during a calibration operation that occurs before the processing of the substrate to reduce a chance of occurrence of a disturbance in plasma impedance, the disturbance caused when said base RF pulsing signal pulses between the high power level and the low power level.

14. The method of claim 13, wherein said control signal is transmitted from one of said plurality of RF power supplies.

15. The method of claim 13, wherein said control signal is transmitted from a master control circuit that is external of said plurality of RF power supplies.

16. The method of claim 13, wherein the RF power supplies in said plurality of RF power supplies generate different RF signals having different RF frequencies.

17. The method of claim 13, wherein said first RF frequency is generated during said high power level of said base RF pulsing signal.

18. The method of claim 13, wherein said second RF frequency is generated during said low power level of said base RF pulsing signal.

19. The method of claim 13, wherein said low power level of said base RF pulsing signal represents zero power.

20. The method of claim 13, wherein said second predefined frequency is associated with zero power.

21. The method of claim 13, wherein said low power level of said base RF pulsing signal represents other than zero power.

22. The method of claim 13, wherein said second predefined frequency is associated with other than zero power.

23. The method of claim 13, wherein the RF power supplies in said plurality of said RF power supplies operate in a non-autotuning mode during said processing.

24. The method of claim 13, further comprising:

sending the base RF pulsing signal and the non-base pulsing RF signal for provision to the electrode.

25. A method comprising:

pulsing a low frequency signal between two power levels,

wherein said pulsing of the low frequency signal is performed during processing of a substrate;

pulsing a high frequency signal between two levels, the high frequency signal having a frequency higher than a frequency of the low frequency signal,

wherein said pulsing of the high frequency signal is performed during the processing of the substrate,

wherein said pulsing of the high frequency signal is synchronous to the pulsing of the low frequency signal,

wherein the two levels of the high frequency signal include a predefined first level and a predefined second level,

wherein the predefined first and second levels of the high frequency signal are defined during a calibration operation that occurs before the processing of the substrate to reduce a chance of occurrence of a disturbance in plasma impedance, the disturbance caused when the low frequency signal pulses between the two power levels.

26. The method of claim 25, wherein the two levels of the high frequency signal include power levels.

27. The method of claim 25, wherein the two levels of the high frequency signal include multiple frequencies.

28. The method of claim 25, wherein the predefined first and second levels reduce a change in a level of the high frequency signal, the change occurring as a result of a transition of the low frequency signal between the power levels.

29. The method of claim 25, wherein the predefined second level is a positive power level.

CLAIMS

What is claimed is:

1. A method for processing a substrate in a plasma processing chamber having at least one electrode, said plasma processing chamber having a plurality of RF power supplies coupled to provide a plurality of RF signals to said electrode, comprising:

pulsing a base RF pulsing signal between a high power level and a low power level at a first pulsing frequency, said base RF pulsing signal representing a first RF signal of said plurality of RF signals having the lowest pulsing frequency among pulsing frequencies of said plurality of RF signals, said first pulsing frequency being different from an RF frequency of said base RF pulsing signal;

sending a control signal at least to a subset of said plurality of RF power supplies, wherein said control signal is generated proactively in a manner that does not require sensing, while processing said substrate, of a change in one or more chamber parameters due to said pulsing of said base pulsing signal; and

pulsing each of said subset of plurality of said RF power supplies, responsive to said control signal, between a first predefined RF-power-supply-specific power level and a second predefined RF-power-supply-specific power level different from said first predefined RF-power-supply-specific power level.

2. The method of claim 1 wherein said control signal is transmitted from one of said plurality of RF power supplies.

3. The method of claim 1 wherein said control signal is transmitted from a master control circuit that is external of said plurality of RF power supplies.

4. The method of claim 1 wherein said subset of said plurality of RF power supplies does not include an RF power supply that pulses said base RF pulsing signal.

5. The method of claim 1 wherein RF power supplies in said subset of plurality of RF power supplies generate different RF signals having different RF frequencies.

6. The method of claim 1 wherein said first predefined RF-power-supply-specific power level is generated during said high power level of said base RF pulsing signal.

7. The method of claim 1 wherein said second predefined RF-power-supply-specific power level is generated during said low power level of said base RF pulsing signal.

8. The method of claim 1 wherein said low power level of said RF pulsing signal represents zero power.

9. The method of claim 1 wherein said second predefined RF-power-supply-specific power level represents zero power.

10. The method of claim 1 wherein said low power level of said RF pulsing signal represents other than zero power.

11. The method of claim 1 wherein said second predefined RF-power-supply-specific power level represents other than zero power.

12. A method for processing a substrate in a plasma processing chamber having at least one electrode, said plasma processing chamber having a plurality of RF power supplies coupled to provide a plurality of RF signals to said electrode, comprising:

pulsing a base RF pulsing signal between a high power level and a low power level at a first pulsing frequency, said base RF pulsing signal representing a first RF signal of said plurality of RF signals having the lowest pulsing frequency among pulsing frequencies of said plurality of RF signals, said first pulsing frequency being different from an RF frequency of said base RF pulsing signal;

sending a control signal at least to a subset of said plurality of RF power supplies, wherein said control signal is generated proactively in a manner that does not require

sensing, while processing said substrate, of a change in one or more chamber parameters due to said pulsing of said base pulsing signal; and

switching an RF frequency of an RF signal output by each of said subset of plurality of said RF power supplies, responsive to said control signal, between a first predefined RF-power-supply-specific RF frequency and a second predefined RF-power-supply-specific RF frequency different from said first predefined RF-power-supply-specific RF frequency.

13. The method of claim 12 wherein said control signal is transmitted from one of said plurality of RF power supplies.

14. The method of claim 12 wherein said control signal is transmitted from a master control circuit that is external of said plurality of RF power supplies.

15. The method of claim 12 wherein said subset of said plurality of RF power supplies does not include an RF power supply that pulses said base RF pulsing signal.

16. The method of claim 12 wherein RF power supplies in said subset of plurality of RF power supplies generate different RF signals having different RF frequencies.

17. The method of claim 12 wherein said first predefined RF-power-supply-specific power level is generated during said high power level of said base RF pulsing signal.

18. The method of claim 12 wherein said second predefined RF-power-supply-specific power level is generated during said low power level of said base RF pulsing signal.

19. The method of claim 12 wherein said low power level of said RF pulsing signal represents zero power.

20. The method of claim 12 wherein said second predefined RF-power-supply-specific power level represents zero power.

21. The method of claim 12 wherein said low power level of said RF pulsing signal represents other than zero power.

22. The method of claim 12 wherein said second predefined RF-power-supply-specific power level represents other than zero power.

23. The method of claim 12 wherein RF power supplies in said subset of plurality of said RF power supplies operate in the non-autotuning mode during said processing.