

What is claimed is:

1. A plasma generating system, comprising:

a microwave generator for generating microwave energy; and

a power supply for providing electrical power to the microwave generator and including a controller that comprises:

at least one microprocessor; and

a module communicatively coupled to the at least one processor and including at least one of digital input-output (DIO) and analogue input-output (AIO),

a waveguide coupled to the microwave generator and configured to transmit the microwave energy therethrough;

an inner wall disposed within the waveguide to define a plasma cavity, a plasma being generated within the plasma cavity using the microwave energy;

an adaptor mounted on a bottom side of the waveguide and including one or more passageways through which a first gas is introduced into the plasma cavity and configured to generate a first vortex flow within the plasma cavity using the first gas, the adaptor having a through hole through which a gas that is processed by the plasma and moves toward the bottom side of the waveguide exits the plasma cavity; and

a plasma stabilizer having a shape of a circular hollow cylinder and installed on a top side of the waveguide and protruding into the plasma cavity, a longitudinal direction of the plasma stabilizer being parallel to a rotational axis of the first vortex flow, wherein the one or more passageways of the adaptor are disposed on the bottom side of the waveguide.

2. A plasma generating system as recited in claim 1, further comprising:

a programmable logic controller (PLC) communicatively coupled to the power supply by a daisy chain network.

3. A plasma generating system as recited in claim 2, wherein the daisy chain network includes an Ethernet cable.
4. A plasma generating system as recited in claim 2, further comprising:
a graphic user interface (GUI) communicatively coupled to the PLC.
5. A plasma generating system as recited in claim 1, further comprising:
one or more sensors communicatively coupled to and configured to exchange data with the module.
6. A plasma generating system as recited in claim 5, wherein the one or more sensors are coupled to the module by a cable harness.
7. A plasma generating system as recited in claim 1, further comprising:
a first flow rate sensor coupled to the module and configured to measure a flow rate of the first gas.
8. A plasma generating system as recited in claim 7, further comprising:
a valve coupled to the module and configured to control the flow rate of the first gas.
9. A plasma generating system as recited in claim 7, further comprising:
a flow inlet mounted on a second side of the waveguide and configured to introduce a second gas into the plasma cavity; and
a second flow rate sensor coupled to the module and configured to measure a flow rate of the second gas.
10. A plasma generating system as recited in claim 9, further comprising:
a valve coupled to the module and configured to control the flow rate of the second gas.
11. A plasma generating system, comprising:
a programmable logic controller (PLC); and

a plurality of reactor systems coupled to the PLC by a daisy chain network, wherein the PLC is configured to send a command to each of the plurality of reactor systems by sending a signal via the daisy chain network, each of the plurality of reactor systems including:

a microwave generator for generating microwave energy; and

a power supply for providing electrical power to the microwave generator and including a controller that comprises:

at least one microprocessor; and

a module communicatively coupled to the at least one processor and including at least one of digital input-output (DIO) and analogue input-output (AIO).

12. A plasma generating system as recited in claim 11, wherein the daisy chain network includes an Ethernet cable.

13. A plasma generating system as recited in claim 11, further comprising:

a graphic user interface (GUI) communicatively coupled to the PLC.

14. A plasma generating system as recited in claim 11, wherein each of the plurality of reactor systems further includes:

one or more sensors communicatively coupled to and configured to exchange data with the module.

15. A plasma generating system as recited in claim 14, wherein the one or more sensors are coupled to the module by a cable harness.

16. A plasma generating system as recited in claim 11, wherein each of the plurality of reactor systems further includes:

a waveguide coupled to the microwave generator and configured to transmit the microwave energy therethrough;

an inner wall disposed within the waveguide to define a plasma cavity, a plasma being generated within the plasma cavity using the microwave energy;

an adaptor mounted on a first side of the waveguide and configured to introduce a first gas into the plasma cavity and including a gas outlet through which a gas processed by the plasma exits the plasma cavity; and

a first flow rate sensor coupled to the module and configured to measure a flow rate of the first gas.

17. A plasma generating system as recited in claim 16, further comprising;

a valve coupled to the module and configured to control the flow rate of the first gas.

18. A plasma generating system as recited in claim 16, further comprising;

a flow inlet mounted on a second side of the waveguide and configured to introduce a second gas into the plasma cavity; and

a second flow rate sensor coupled to the module and configured to measure a flow rate of the second gas.

19. A plasma generating system as recited in claim 18, further comprising;

a valve coupled to the module and configured to control the flow rate of the second gas.