

What is claimed is:

1. An impedance matching method for matching an impedance of a load connected to an RF source to an impedance of the RF source, wherein the impedance matching method comprises:

selectively performing an automatic matching step or a frequency scan matching step based on an operation mode of the RF source;

wherein:

in the automatic matching step, instructing a motor to drive the impedance matching network to provide a certain impedance;

in the frequency scan matching step, instructing the motor to stop driving and the RF source to perform frequency scanning operation; and

the operation mode of the RF source is a pulsed dual-level mode, and the pulsed dual-level mode comprises a high-level phase and a low-level phase; in the high-level phase, performing the automatic matching step; in the low-level phase, performing the frequency scan matching step; or, in the high-level phase, performing the frequency scan matching step; in the low-level phase, performing the automatic matching step.

2. The impedance matching method according to claim 1, wherein a power output by the RF source in the high-level phase is different from a power output by the RF source in the low-level phase.

3. An impedance matching device for matching impedance of a load connected to an RF source to the impedance of the RF source, wherein the impedance matching device comprises:

an impedance matching network;

a motor for driving the impedance matching network to provide a certain impedance; and

a controller for selectively issuing a first command or a second command according to an operation mode of the RF source, wherein the first command instructs the motor to drive the impedance matching network to provide a certain impedance; the second command instructs the motor to stop driving and the RF source to perform a frequency scanning operation; and

the operation mode of the RF source is a pulsed dual-level mode, and the pulsed dual-level mode comprises a high-level phase and a low-level phase; in the high-level phase, performing the automatic matching step; in the low-level phase, performing the frequency scan matching step; or, in the high-level phase, performing the frequency scan matching step; in the low-level phase, performing the automatic matching step.

4. The impedance matching device according to claim 3, wherein a frequency of the RF source is at least one of: 2 MHz, 13.56 MHz, and 60 MHz.

5. The impedance matching device according to claim 3, wherein the RF source is pulse modulated at a modulation frequency of 10 Hz to 20 kHz and a duty ratio of 10%

to 90%.

6. A plasma generating apparatus, comprising: an RF source, a load connected to the RF source, and an impedance matching device for matching an impedance of the load to the impedance of the RF source, wherein the impedance matching device is the impedance matching device according to any one of claims 3 to 5.

7. The plasma generating apparatus according to claim 6, wherein the plasma generating apparatus comprises an inductively coupled plasma generating apparatus, a capacitively coupled plasma generating apparatus, a microwave plasma generating apparatus, or an electron cyclotron resonance plasma generating apparatus.

8. The plasma generating apparatus according to claim 6, wherein the plasma generating apparatus is implemented in a plasma etching machine.