load. The polarizing tube has a circular polarization opening and a linear polarization opening. The circular polarization opening is disposed on an end of the polarizing tube and faces toward the microwave window of the reaction chamber. The linear polarization opening is disposed on another end of the polarizing tube. When an external linearly-polarized microwave enters the polarizing tube via the linear polarization opening, said external linearly-polarized microwave is converted into a circularly-polarized microwave and exits via the circular polarization opening; when an external circularly-polarized microwave enters the polarizing tube via the circular polarization opening, said external circularly-polarized microwave is converted into a linearly-polarized microwave and exits via the linear polarization opening. The directing tube has a main opening, a first opening, and a second opening. The main opening is disposed on an end of the directing tube and is connected to the linear polarization opening of the polarizing tube. The second opening is disposed on a sidewall of the directing tube. An opening direction toward which the second opening faces is non-parallel to an opening direction toward which the first opening faces. An end of the first waveguide is connected to the first opening of the directing tube, and another end of the first waveguide is connected to the first linearly-polarized microwave source. The first linearly-polarized microwave source generates a linearly-polarized microwave. Said linearly-polarized microwave is converted into a circularly-polarized microwave by the polarizing tube and is emitted toward the microwave window of the reaction chamber via the circular polarization opening of the polarizing tube. An end of the second waveguide is connected to the second opening of the directing tube. The first matched load is mounted on the second waveguide. The microwave lens is disposed between the circular polarization opening of the polarizing tube of the microwave emitting module and the diamond holder of the reaction chamber. The microwave lens converges the circularly-polarized microwave emitted by the microwave emitting module to the focus region of the diamond holder. The directing tube of the microwave emitting module is circular in cross-section. The first waveguide and

the second waveguide of the microwave emitting module are rectangular in cross-section. The first opening and the main opening are disposed oppositely on the directing tube. The microwave emitting module has a connecting sleeve located around the directing tube. The second waveguide is connected to an outer surface of the connecting sleeve. The connecting sleeve has a conversion hole being elongated and connecting the outer surface and an inner surface of the connecting sleeve, and one of two opposite openings of the conversion hole is connected to the second opening of the directing tube; the other one of the two opposite openings of the conversion hole is connected to the second waveguide. A width of the conversion hole gradually reduces toward the second opening.

The advantage of the present invention is that the microwave emitting module

WHAT IS CLAIMED IS:

1. An artificial diamond plasma production device comprising:

a reaction chamber being hollow and having

a microwave window disposed on the reaction chamber such that an external microwave is capable of traveling into the reaction chamber via the microwave window;

a diamond holder disposed in the reaction chamber, wherein an imaginary focus region is defined on the diamond holder;

a microwave emitting module disposed outside of the reaction chamber and emitting a circularly-polarized microwave toward the microwave window of the reaction chamber; the microwave emitting module having a polarizing tube, a directing tube, a first waveguide, and a first linearly-polarized microwave source that are serially connected; the microwave emitting module further having a second waveguide and a first matched load; wherein

the polarizing tube has

a circular polarization opening disposed on an end of the polarizing tube and facing toward the microwave window of the reaction chamber; and

a linear polarization opening disposed on another end of the polarizing tube;

wherein when an external linearly-polarized microwave enters the polarizing tube via the linear polarization opening, said external linearly-polarized microwave is converted into a circularly-polarized microwave and exits via the circular polarization opening; when an external circularly-polarized microwave enters the polarizing tube via the circular polarization opening, said external circularly-polarized microwave is converted into a linearly-polarized microwave and exits via the linear polarization opening;

the directing tube has:

a main opening disposed on an end of the directing tube and connected to the linear polarization opening of the polarizing tube;

a first opening; and

a second opening disposed on a sidewall of the directing tube; an opening direction toward which the second opening faces being non-parallel to an opening direction toward which the first opening faces;

an end of the first waveguide is connected to the first opening of the directing tube; another end of the first waveguide is connected to the first linearly-polarized microwave source;

the first linearly-polarized microwave source generates a linearly-polarized microwave; said linearly-polarized microwave is converted into a circularly-polarized microwave by the polarizing tube and is emitted toward the microwave window of the reaction chamber via the circular polarization opening of the polarizing tube;

an end of the second waveguide is connected to the second opening of the directing tube; and

the first matched load is mounted on the second waveguide; and

a microwave lens is disposed between the circular polarization opening of the polarizing tube of the microwave emitting module and the diamond holder of the reaction chamber; the microwave lens converging the circularly-polarized microwave emitted by the microwave emitting module to the focus region of the diamond holder;~~.~~

wherein, the directing tube of the microwave emitting module is circular in cross-section; the first waveguide and the second waveguide of the microwave emitting module are rectangular in cross-section;

wherein, the first opening and the main opening are disposed oppositely on the directing tube; and the microwave emitting module has a connecting sleeve located around the directing tube; the second waveguide is connected to an outer surface of the

connecting sleeve; the connecting sleeve has:

a conversion hole being elongated and connecting the outer surface and an inner surface of the connecting sleeve; one of two opposite openings of the conversion hole connected to the second opening of the directing tube; the other one of the two opposite openings of the conversion hole connected to the second waveguide; a width of the conversion hole gradually reducing toward the second opening.

2. The artificial diamond plasma production device as claimed in claim 1, wherein the microwave emitting module has

a second linearly-polarized microwave source mounted on another end of the second waveguide; the second linearly-polarized microwave source generating a linearly-polarized microwave, said linearly-polarized microwave converted into a circularly-polarized microwave by the polarizing tube and emitted toward the microwave window of the reaction chamber via the circular polarization opening of the polarizing tube; and

a second matched load mounted on the first waveguide.

~~3. The artificial diamond plasma production device as claimed in claims 1 or 2, wherein~~

~~the directing tube of the microwave emitting module is circular in cross-section;~~

~~the first waveguide and the second waveguide of the microwave emitting module are rectangular in cross-section.~~

~~4~~3. The artificial diamond plasma production device as claimed in claim 1~~3~~, wherein

~~the first opening and the main opening are disposed oppositely on the directing tube;~~

the microwave emitting module has a rectangular-to-circular tube connected between the first waveguide and the first opening of the directing tube; a cross section of an inner surface of the rectangular-to-circular tube gradually transforms from rectangular to circular.

~~5. The artificial diamond plasma production device as claimed in claim 3, wherein~~

~~the first opening and the main opening are disposed oppositely on the directing tube; and~~

~~the microwave emitting module has a connecting sleeve located around the directing tube; the second waveguide is connected to an outer surface of the connecting sleeve; the connecting sleeve has~~

~~a conversion hole being elongated and connecting the outer surface and an inner surface of the connecting sleeve; one of two opposite openings of the conversion hole connected to the second opening of the directing tube; the other one of the two opposite openings of the conversion hole connected to the second waveguide; a width of the conversion hole gradually reducing toward the second opening.~~

~~6~~4. The artificial diamond plasma production device as claimed in claim ~~5~~1, wherein two opposite walls defined by ~~of~~ the conversion hole are step-shaped such that the width of the conversion hole gradually reduces toward the second opening.

~~7. The artificial diamond plasma production device as claimed in claim 4, wherein the microwave emitting module has a connecting sleeve located around the directing tube; the second waveguide is connected to an outer surface of the connecting sleeve; the connecting sleeve has~~

~~a conversion hole being elongated and connecting the outer surface and an inner surface of the connecting sleeve; one of two opposite openings of the conversion hole connected to the second opening of the directing tube; the other one of the two opposite openings of the conversion hole connected to the second waveguide; a width of the conversion hole gradually reducing toward the second opening.~~

~~8~~5. The artificial diamond plasma production device as claimed in claim ~~7~~3, wherein two opposite walls defined by the conversion hole are step-shaped such that the width of the conversion hole gradually reduces toward the second opening.

~~9. The artificial diamond plasma production device as claimed in claim 3, wherein~~

~~the first opening of the directing tube is located on the sidewall of the directing tube;~~

~~the microwave emitting module has a connecting sleeve located around the directing tube; the second waveguide is connected to an outer surface of the connecting sleeve; the connecting sleeve has~~

~~two conversion holes; each of the conversion holes being elongated and connecting the outer surface and an inner surface of the connecting sleeve; the two conversion holes being~~

~~a first conversion hole; one of two opposite openings of the first conversion hole connected to the first opening of the directing tube; the other one of the two opposite openings of the first conversion hole connected to the first waveguide; a width of the first conversion hole gradually reducing toward the first opening; and~~

~~a second conversion hole; one of two opposite openings of the second conversion hole connected to the second opening of the directing tube; the other one of the two opposite openings of the second conversion hole connected to the second waveguide; a width of the second conversion hole gradually reducing toward the second opening.~~

~~10~~6. The artificial diamond plasma production device as claimed in claim~~s~~ 1 or 2, wherein the opening direction toward which the first opening of the directing tube faces is perpendicular to the opening direction toward which the second opening of the directing tube faces.