viruses etc. in the air by efficiently generating plasma while reducing input power as compared to the conventional technology.

[Solution to Problem]
[0010]

According to a first aspect of the present disclosure, there is provided an air purification system that generates plasma using voltage, the air purification system including: a first electrode that generates electromagnetic resonance when power is supplied; a second electrode disposed surrounding the first electrode in a state of being separated from the first electrode; a power feeder that supplies power to the first electrode; an electric field probe that measures an intensity of an electric field between the first electrode and the second electrode; and a controller that controls the power supplied to the first electrode, wherein the controller performs control by adjusting a frequency of the power supplied to the first electrode and a position at which the power is supplied to the first electrode, to cause a half wavelength during electromagnetic resonance of the first electrode to be a sum of a length of the first electrode and a length of plasma generated, and maximize an output value of a signal indicating the intensity of the electric field measured by the electric field probe.
[0011]

The air purification system further incorporates therein a detector that monitors the amounts of ozone and nitrogen oxides generated. With the amounts of ozone and nitrogen oxides generated set as targets to be controlled, the air purification system changes alternating current (AC) power, the frequency, and the power feeding point to be able to control the electric field applied to plasma so that an energy at which oxygen molecules are dissociated by plasma and ozone is thereby generated but nitrogen molecules are not dissociated and generation of nitrogen oxides is thereby minimized is inputted to gas molecules.
[0012]

According to a second aspect of the present disclosure, there is provided protective clothing including: the above air purification system; and a covering body that is provided with the air purification system and covers a surface of a body of a person, wherein the air

[CLAIMS]

[Claim 1]

An air purification system that generates plasma using voltage, the air purification system comprising:

a first electrode that generates electromagnetic resonance when power is supplied;

a second electrode disposed surrounding the first electrode in a state of being separated from the first electrode;

a power feeder that supplies power to the first electrode;

an electric field probe that measures an intensity of an electric field between the first electrode and the second electrode; and

a controller that controls the power supplied to the first electrode,

wherein the controller performs control by adjusting a frequency of the power supplied to the first electrode and a position at which the power is supplied to the first electrode, to cause a half wavelength during electromagnetic resonance of the first electrode to be a sum of a length of the first electrode and a length of plasma generated, and maximize an output value of a signal indicating the intensity of the electric field measured by the electric field probe.

[Claim 2]

The air purification system according to claim 1,

wherein the controller obtains, from a detector, a measurement result of a content of ozone contained in air that has passed through a region between the first electrode and the second electrode, and based on the measurement result obtained, performs control by adjusting the power supplied, to (i) cause an amount of ozone generated due to plasma generation to become constant at all times and (ii) apply an energy having an intermediate value between a dissociation energy of oxygen molecules and a dissociation energy of nitrogen molecules, at which nitrogen oxides are substantially not generated.

[Claim 3]

The air purification system according to claim 2,

wherein the power supplied to the first electrode is alternating current (AC) power, and

the controller performs control by adjusting an amplitude of the AC power supplied, to cause the amount of ozone generated to become constant at all times.

[Claim 4]

The air purification system according to claim 3,

wherein a waveform of the AC power supplied to the first electrode is a waveform obtained by performing amplitude modulation on a carrier wave, and

the controller performs control by adjusting the amplitude modulation, to cause the amount of ozone generated to become constant.

[Claim 5]

The air purification system according to claim 4,

wherein the waveform of the AC power supplied to the first electrode is a waveform obtained by performing amplitude modulation on a carrier wave, and

the controller performs control to cause the amount of ozone generated to become constant, by adjusting the amplitude modulation to cause a value of the amplitude modulation to intermittently repeat a given value and zero.

[Claim 6]

The air purification system according to any one of claims 1 to 5,

wherein the controller performs control by adjusting the power supplied, to cause a concentration of ozone generated to be less than or equal to 0.1 ppm.

[Claim 7]

The air purification system according to any one of claims 1 to 6, comprising:

an actuator that changes a position of a power feeding point at which the power feeder supplies the power to the first electrode,

wherein the controller adjusts the position of the power feeding point by operating the actuator.

[Claim 8]

The air purification system according to claim 7,

wherein the controller performs control by adjusting two parameters, namely the frequency and the position of the power feeding point on the first electrode, to cause an output voltage of the electric field probe to reach a local maximum.

[Claim 9]

The air purification system according to any one of claims 1 to 8,

wherein the second electrode is a housing including an inlet through which air is taken in,

the air purification system comprising:

a filter that is disposed in vicinity of an outlet through which the air taken in through the inlet is discharged, and that, when the air taken in through the inlet passes through, removes a nitrogen oxide and ozone generated by a plasma reactor including the first electrode and the second electrode.

[Claim 10]

The air purification system according to any one of claims 1 to 9,

wherein the first electrode is an elongated electrode,

the second electrode forms, in a longitudinal direction of the first electrode, a space that is elongated and accommodates the first electrode, and

in the space, a plasma generation region for generating

plasma is provided between the first electrode and an inlet of the second electrode.

[Claim 11]

The air purification system according to claim 9 or 10,

wherein the controller adjusts input power inputted to a plasma reactor, to apply a dissociation energy of oxygen molecules contained in the air taken in through the inlet.

[Claim 12]

The air purification system according to any one of claims 1 to 11,

wherein plasma is generated using power having a waveform obtained by performing amplitude modulation on a carrier wave having a frequency in a range of from 100 MHz to 10 GHz, to cause an amount of ozone generated to become constant.

[Claim 13]

Protective clothing comprising:

the air purification system according to any one of claims 1 to 12; and

a covering body that is provided with the air purification system and covers a surface of a body of a person,

wherein the air purification system purifies air taken in from outside and supplies purified air into the covering body.