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Title	Low-temperature Plasma Source Capable of Generating Various Reactive Species and Irradiating Living Organisms
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# Low-temperature Plasma Source Capable of Generating Various Reactive Species and Irradiating Living Organisms



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## 1. Atmospheric Pressure Low-Temperature Plasma

At the beginning of this century, it became possible to generate low-temperature plasma under atmospheric pressure, attracting attention not only in the field of materials but also in the fields of medicine and life sciences.

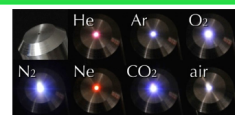
- Low temperature
- Non-residual toxicity
- No discharge and thermal damage



✓ Safe plasma irradiation to living tissue and cells

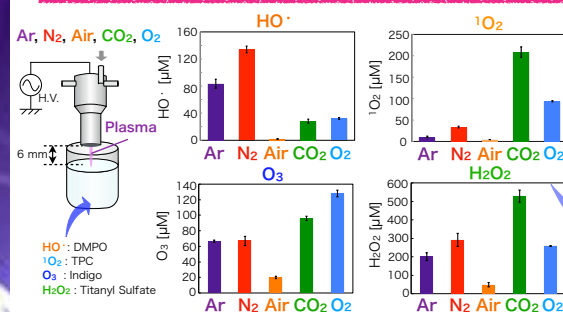


## 2. Measurement of Reactive Species in Plasma of Various Gas Types

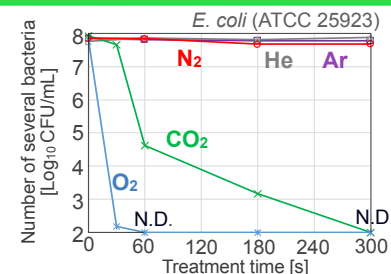


Plasma can be generated with various gas types

Capable of generating various reactive species



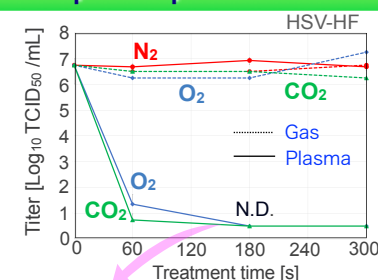
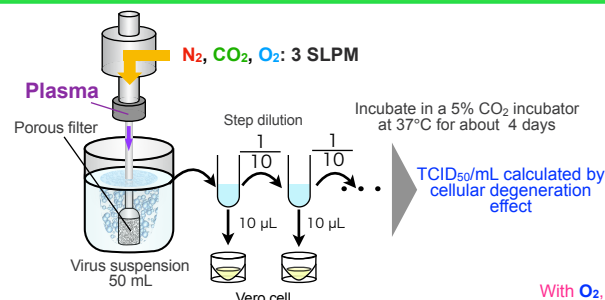
## 3. Disinfection Effect of Plasma Bubbling on *Escherichia coli*



- N<sub>2</sub>, He, Ar plasma did not produce a disinfection effect
- Remarkable disinfection effect with O<sub>2</sub> and CO<sub>2</sub> plasma

<sup>1</sup>O<sub>2</sub>, O<sub>3</sub>, H<sub>2</sub>O<sub>2</sub> are contributed to disinfection?

## 4. Inactivation Effect of Plasma Bubbling on Herpes Simplex Virus



With O<sub>2</sub>, CO<sub>2</sub> plasma, the titer of the virus decreased to almost zero after 180 seconds of treatment.

Similar results were obtained for *E. coli* disinfection.



Similar reactive species (<sup>1</sup>O<sub>2</sub>, O<sub>3</sub>, H<sub>2</sub>O<sub>2</sub>) are thought to contribute to disinfection and viral inactivation.

## 5. Summary and Future Plans

- ✓ The reactive species produced in the plasma depended on the type of plasma gas.
- ✓ O<sub>2</sub> and CO<sub>2</sub> plasma showed remarkable bactericidal and virus inactivation effects.
- ✓ Similar reactive species were shown to possibly contribute to bactericidal and viral inactivation.
- Measurement of other reactive species
- Inactivation of non-enveloped virus by plasma bubbling