

# Thrust Enhancement of Plasma Actuator by Electric field effect

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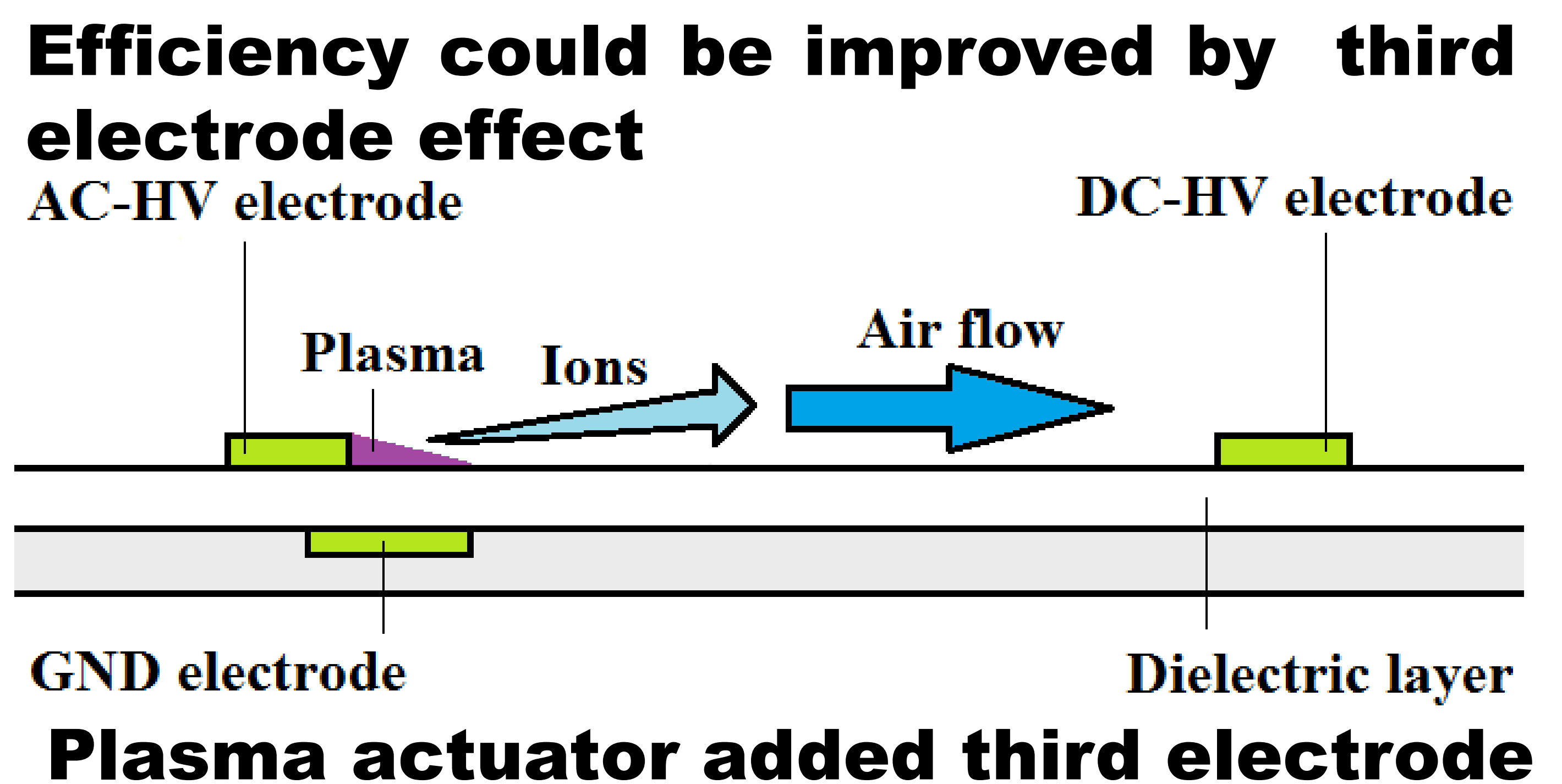
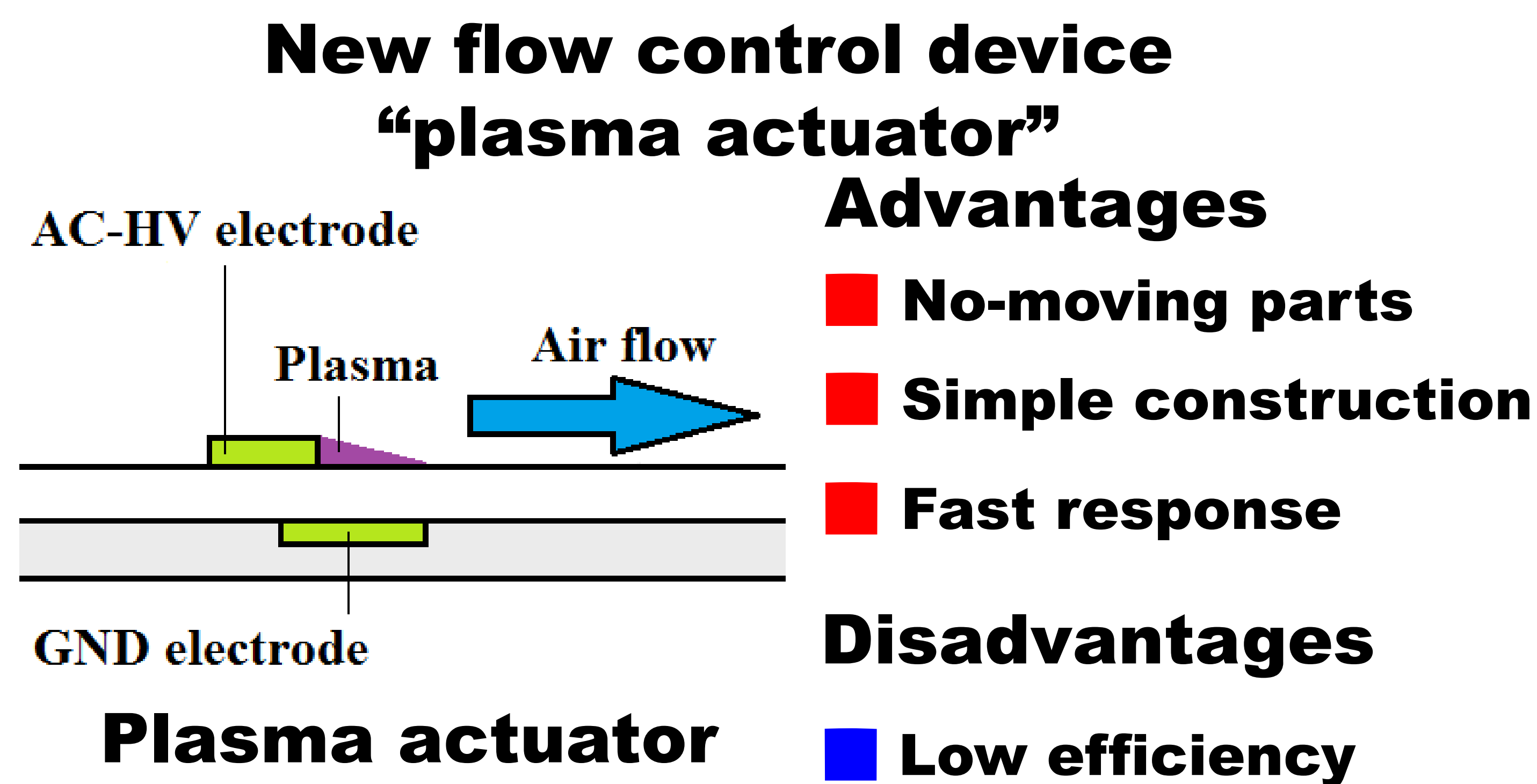
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Atmospheric non-thermal plasma has attracted much attention as future flow control device, called dielectric barrier discharge (DBD) plasma actuator. In, this study, to enhance the thrust, the third electrode with DC high voltage has added. Thrust was increased by 108 %, also thrust-power ratio was increased by 102 %, by adding the third electrode with positive 8 kV.

## 1. Objectives

Improving the efficiency of plasma actuator by electric field, driving ions to the third electrode



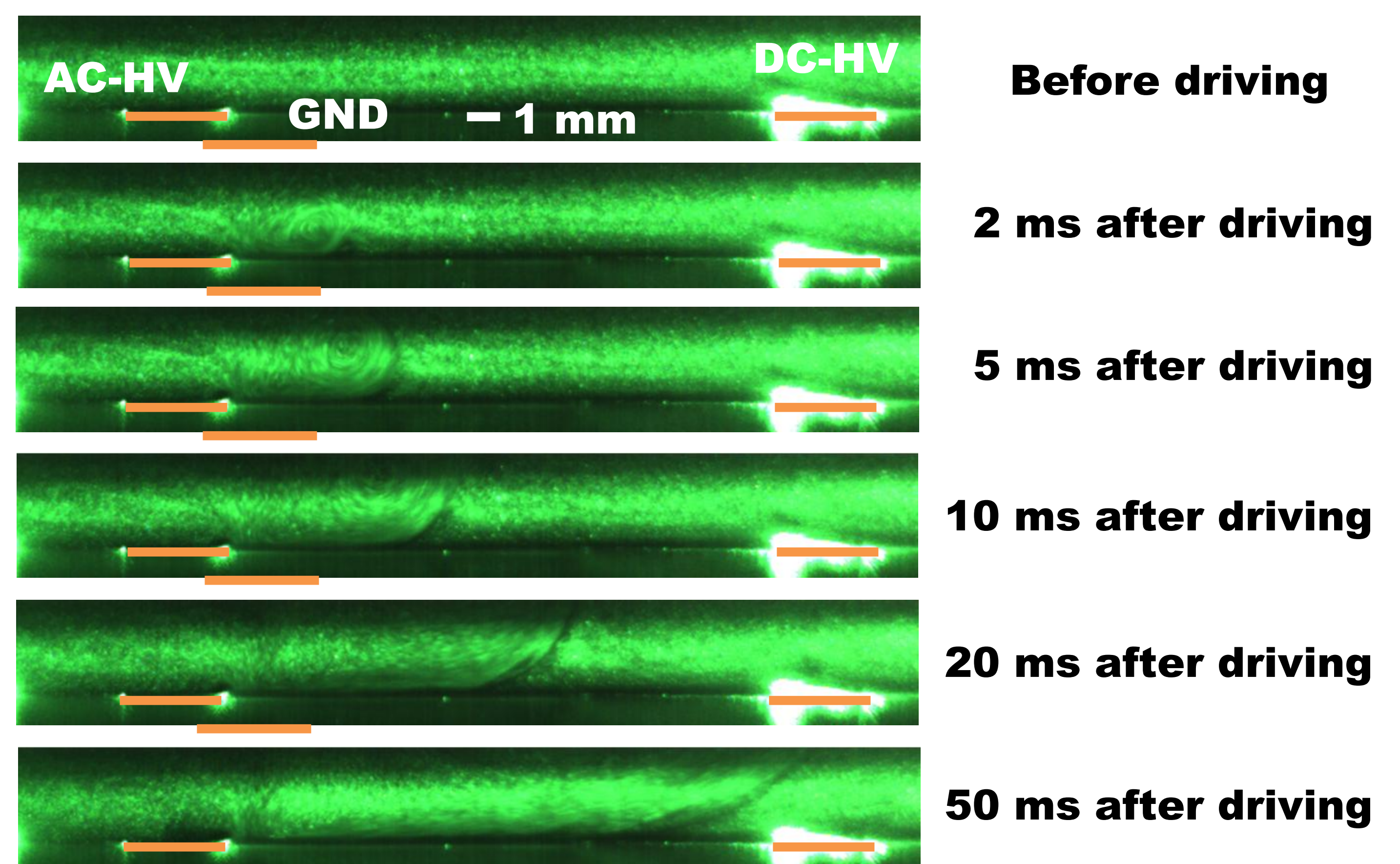
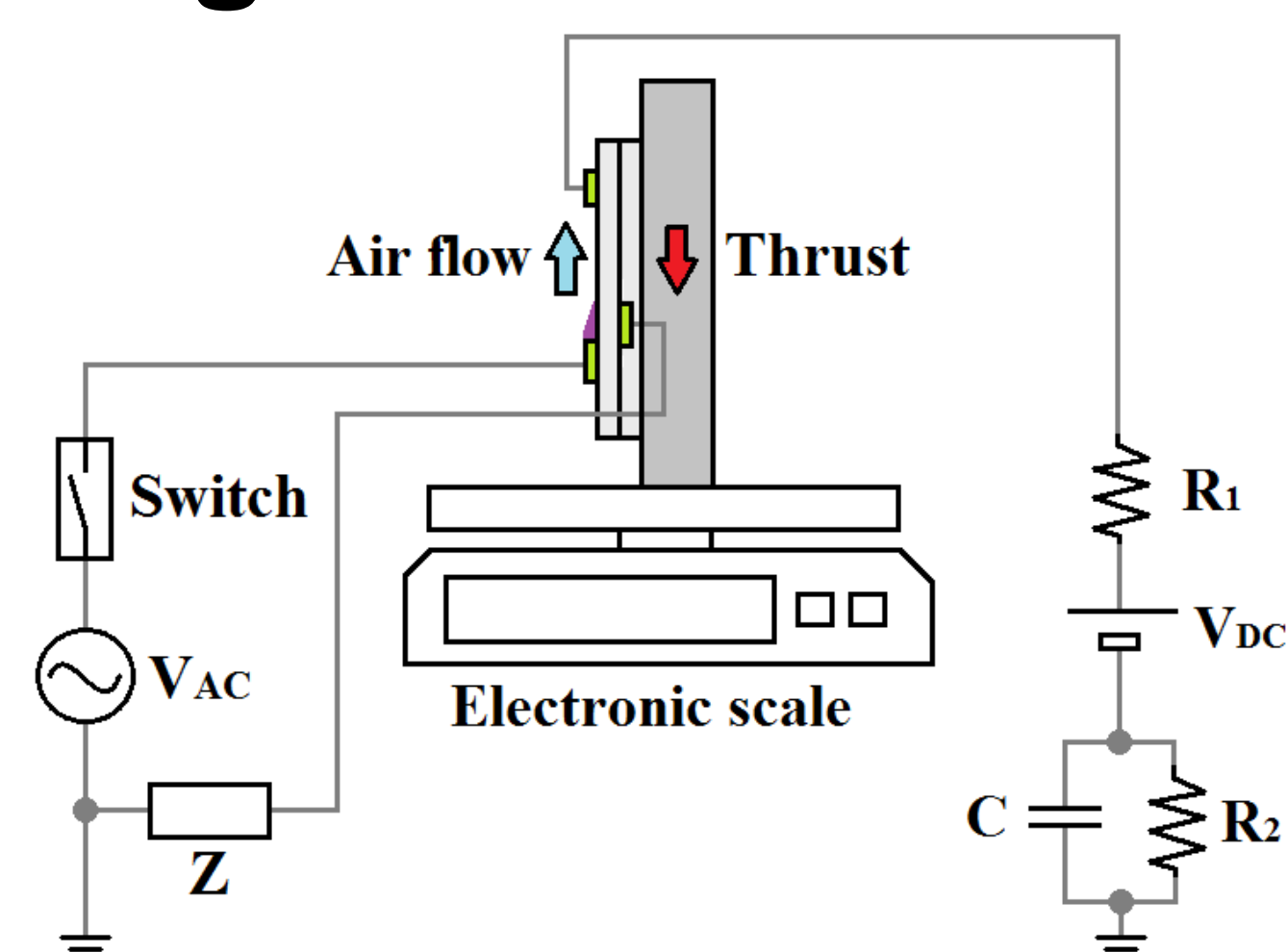
## 2. Experimental setup

### Measuring items

- Power consumption
- Thrust

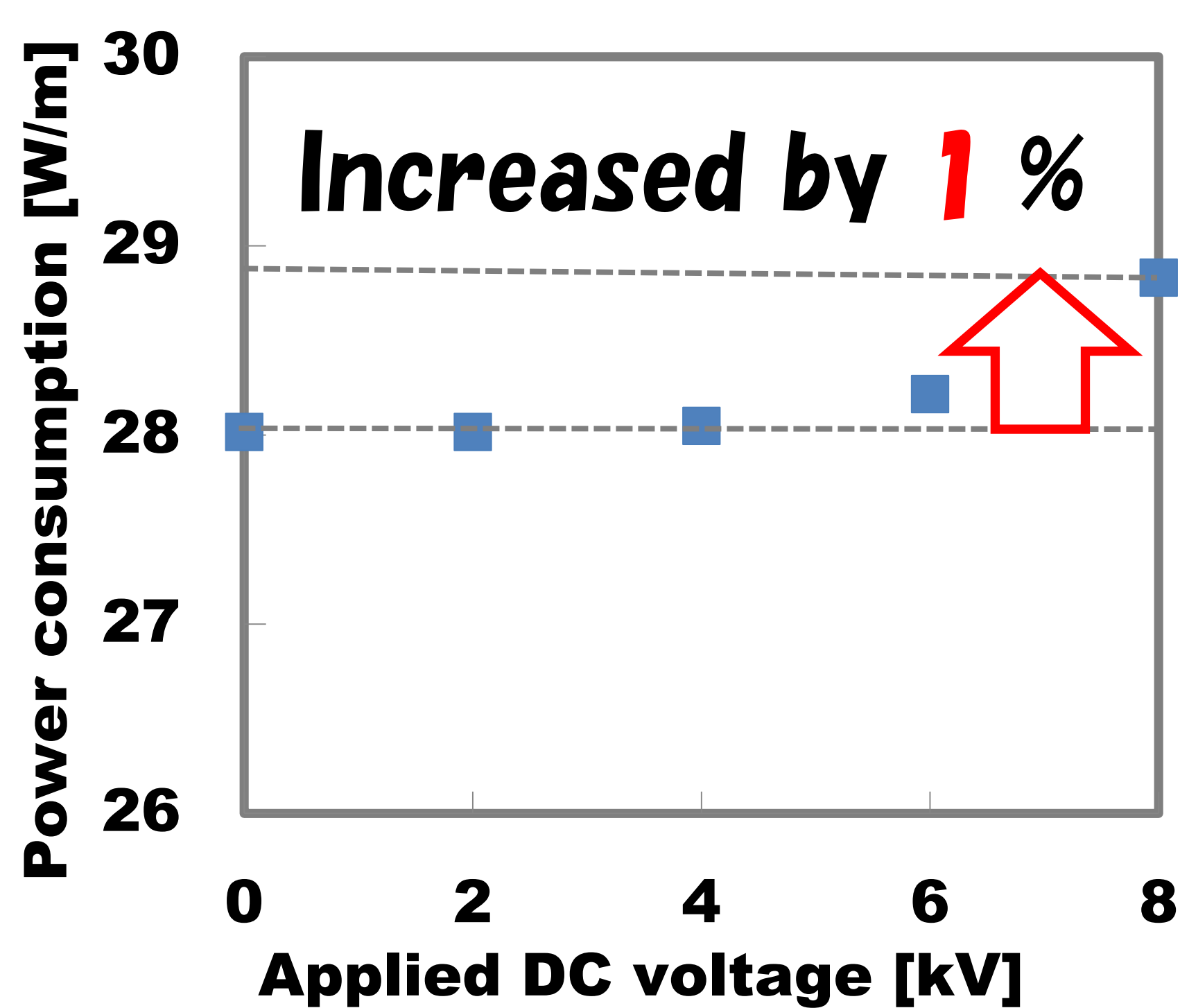
### Voltage condition

- AC voltage : sinusoidal 4 kV 20 kHz
- DC voltage : 0 ~ 8 kV

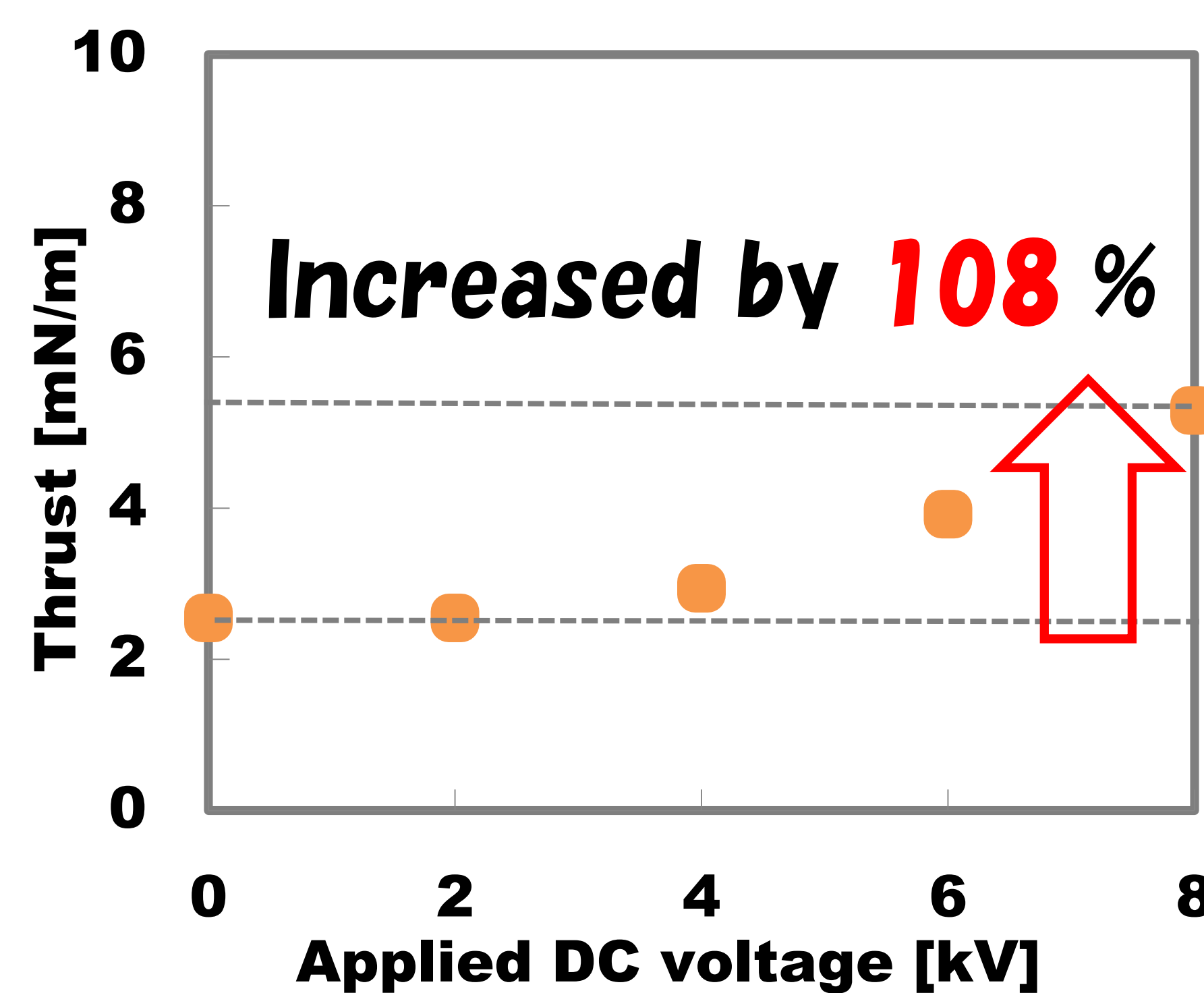


A schematic of plasma actuator and visualization the induced air flow

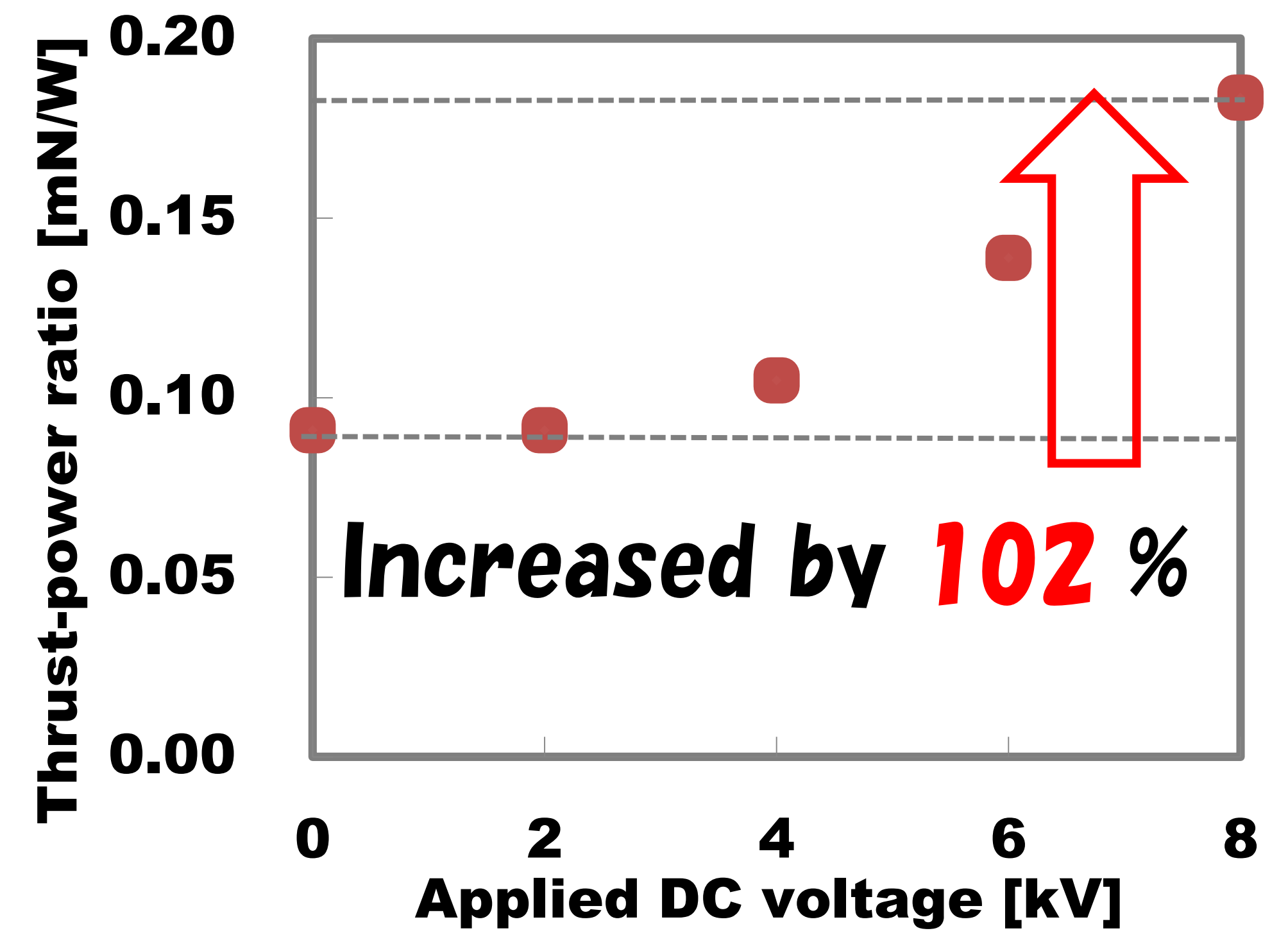
## 3. Results



Power consumption



Thrust measurement



Thrust-power ratio

## 4. Conclusions

- Energizing the third electrode by DC 8 kV, thrust was increased by 108 %, also thrust-power ratio was increased by 102 %, when applied AC voltage was sinusoidal 4 kV 20 kHz.
- Power consumption was increased by only 1 %, when third electrode was driven at positive 8 kV. It could be concluded electric field generated by third electrode could only drive the ions, could not ionize or excite the neutral molecules.