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Measurement of atomic oxygen and estimation of local temperature in narrow gap discharge for ozone generator[1] YUSUKE NAKAGAWA, TAKUYA KAWAKITA, SATOSHI UCHIDA, FUMIYOSHI TOCHIKUBO, Tokyo Metropolitan University — Ozone generator is a very popular application of atmospheric pressure plasma. Recent ozone generators improve the ozone yield and density using sub-mm narrow discharge gap. On another front, ozone generation in pure oxygen has 'ozone zero' problem, which is a gradual drop in ozone yield under continuous operation. Although trace additive gas or electrode surface treatment are known technique to prevent ozone zero, the mechanism has not been investigated in detail. The chemical process near the electrode is quite important to understand the ozone zero mechanism. To clarify the ozone generating reaction near the electrode, we measured the density of atomic oxygen using two-photon absorption laser induced fluorescence (TALIF) method in 0.5 mm narrow gap oxygen discharge. The density of atomic oxygen decays within 40 μs after a discharge pulse, which is supposed to be faster than in air discharge. Besides, the local temperature in discharge region is important to understand the chemical reactions of radicals. The rate coefficients strongly depend on temperature; therefore, we can estimate the temperature by comparing the measured decay of atomic oxygen density with the chemical reaction simulation. The local temperature after the discharge is estimated to be about 480 K.

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Yusuke Nakagawa
Tokyo Metropolitan University

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